WIRE & WIRE PRODUCTS

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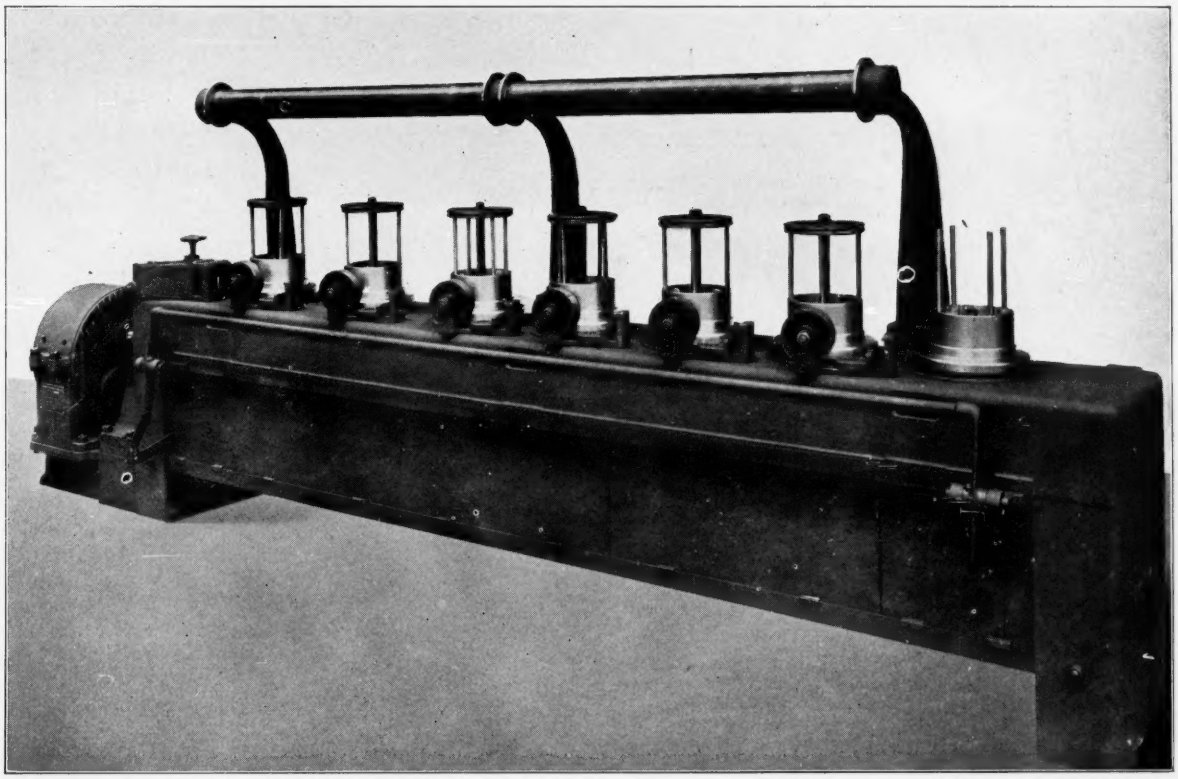

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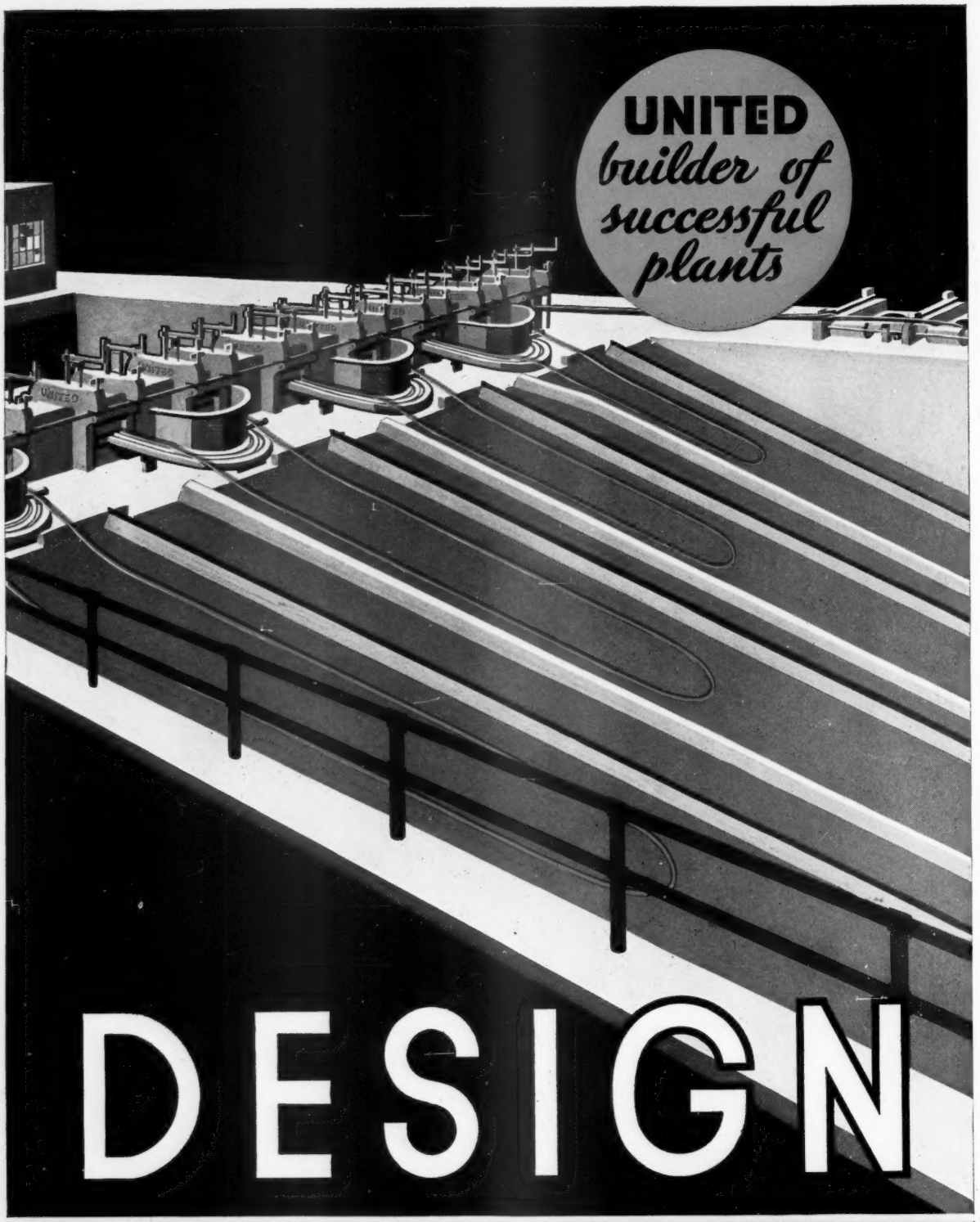

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Vol. 7 May 1932 No. 5

Designated as

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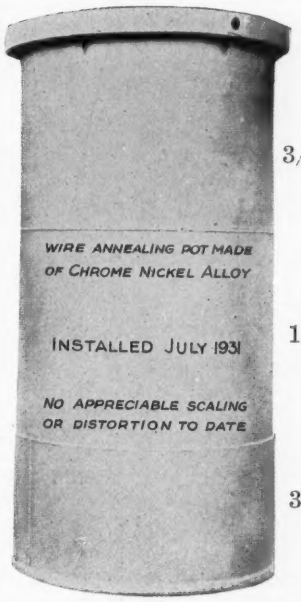

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Wire Products and Insulated Wire and Cable.
DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 7 MAY, 1932 No. 5

Methods of Heating and Cooling Wire

J. A. Doyle, Vice-President,
W. S. Rockwell Co., New York, N. Y.

The points brought out in this article are extremely important, particularly those dealing with the question of uniformity.

It attempts to call to the attention of metallurgists and wire mill men the necessity for care in the operation of furnaces.

Many products have been made "defective" by the carelessness or thoughtlessness on the part of operators in charge of furnaces, and this article brings out much that is of interest along this line.

PREVAILING methods of heating and cooling wire should be considered in light of the increasing demand for uniformity, better finish and lower cost.

Consumer and producer may well consider the possibility of improvement by establishing more definite standards of uniformity as a basis of constructive effort to produce better and cheaper products.

✦ ✦ ✦

MUCH of the difficulty long associated with efforts to improve quality and decrease cost of heat-treated products is due either to a misunderstanding of the factors affecting quality and uniformity and those affecting cost, or their relation to each other, or both, as is often the case. Investigation of the cause will invariably disclose in shop practice a disregard of simple fundamental principles affecting uniformity of all heat-treated products regardless of their composition or nature of the heat-treating process.

✦ ✦ ✦

QUALITY is too often associated in practice with indefinite expressions such as temperature control, uniformity, atmosphere, etc., or with some form of fuel or electricity arbitrarily accepted as a suitable source of heat for production of a quality product. Cost is frequently assumed to be but a matter of price of fuel or electricity, output, labor and, occasionally, fixed charges on the production equipment.

THE nature and relative importance of the factors controlling uniformity will be readily understood as the industry learns to think more in terms of uniform products and less about incidental phases of the process of heat-treatment, and to consider the action of heat on the product as of greater importance than the process of generating heat or the form of fuel or electricity used as a source of heat. For instance, pyrometer charts are all too frequently accepted as evidence of uniform heating or cooling conditions prescribed by the laboratory until irregular stock returned by the customer proves them to be but little more than a weak and expensive alibi. Likewise, cheap

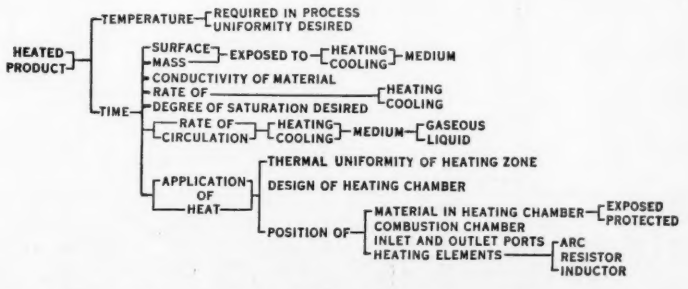

Fig. 1. Factors Determining Uniformity of Heating and Cooling. ✦ ✦ ✦ ✦

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fuel is too often associated with low cost until it is demonstrated that still lower costs are possible with more expensive forms of fuel or electricity properly applied to better furnaces that provide a more desirable heating condition and a lower production cost.

✦ ✦ ✦

Quality and Cost

QUALITY is an essential element of cost. Uniformity is equally an essential element of quality. Both are relative terms usually interpreted with reference to the ultimate use of the product. The interpretation may be one thing for resistance wire and something quite different for fence wire. It will be different for needle wire than for stock to be used for bolts and rivets. Uniformity should be the rule in any case, regardless of the metallurgical standard of quality. The constant effort should be toward the production of uniform products, either uniformly good or relatively poor, but always reasonably uniform.

✦ ✦ ✦

STATEMENT of cost of heat treatment without reference to a given standard of quality or uniformity is of doubtful value because it is indefinite and misleading. The first constructive step in cost reduction is to develop a practical standard of uniformity with reference to a given product, and a proper understanding of the thermal and physical conditions that affect uniformity in structure and surface appearance in the heating and cooling process. The next move should be in the direction of lowering cost of production with better methods of heating and cooling to improve quality, and better methods of handling and heat utilization adapted to specific shop conditions to reduce cost without, however, departing from principles that control uniformity of the finished product.

✦ ✦ ✦

Controlling Factors

THE thermal and physical factors controlling quality and uniformity in structure and surface condition are fundamental and apply with equal force in the laboratory and the shop. The factors affecting cost of production continually vary with the nature of the heat-treating process and equipment, production requirements, individual plant conditions, and a multitude of related details incident to commercial practice. The relation of the thermal and physical factors involved in the process is indicated by Fig. I.

✦ ✦ ✦

VARIATION in quality and uniformity frequently disclosed in laboratory and shop is invariably due to disregard of physical conditions affecting the time and rate of heating and cooling, and the method of heat transfer affecting the individual unit piece or section of the charge. This is the universal weak link in shop practice and the real cause of difficulty frequently attributed to the metal, or the metallurgist, or something else, on the erroneous assumption that a uniform pyrometer chart is proof of uniform heating or cooling.

✦ ✦ ✦

Uniform Exposure Necessary

THE manner of exposing a product in the heating and cooling process is a fundamental factor affecting uniformity in every heat-treating process in the shop as in the kitchen. It is the very basis of uniformity and a starting point in the direction of better and cheaper products that will follow improved shop practice based on sensible consideration of this fact. The art of heat-treating practice in the shop must be brought more in line with the science of metallurgy in the laboratory to develop a better understanding of such fundamental conditions affecting quality, uniformity and ultimate cost.

✦ ✦ ✦

UNIFORM exposure is as essential as uniform temperature, time or atmosphere for production of uniformly heat-treated products. Otherwise, the time and rate of heating and cooling, the amount of heat absorbed, and the effect of the atmosphere may vary even though the pyrometer indicates a uniform temperature and the clock indicates a uniform time period.

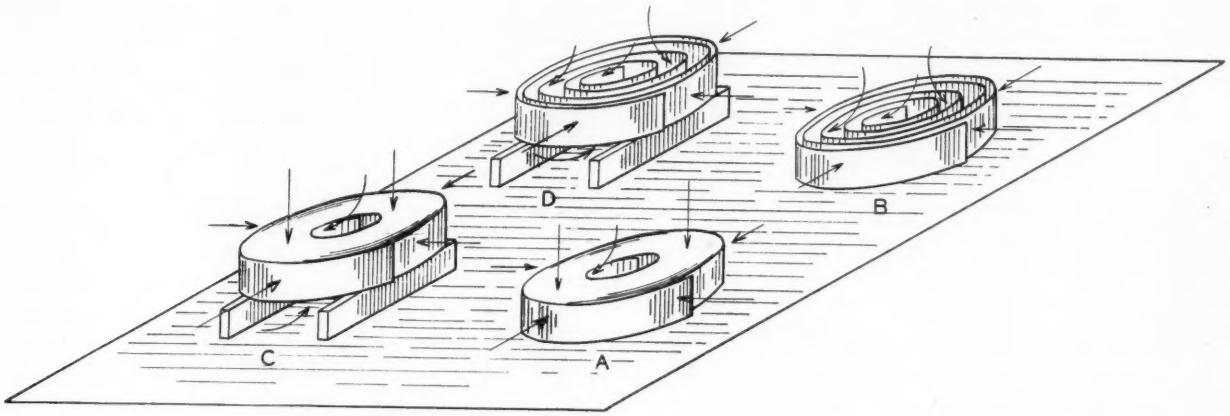

Fig. 2. Different Methods of Heating and Cooling a Coil of Metal ✦ ✦ ✦ ✦ ✦ ✦ ✦ ✦ ✦ ✦

Cooling as Important as Heating

UNIFORM exposure is equally as essential in cooling as in heating. Control of the rate of cooling usually affects the metallurgical structure of the metal. The physical factors controlling uniformity in heating or cooling are similar. The essential difference is in the rate and time of cooling. The tendency in practice to control the rate of heating and disregard control of the rate of cooling, particularly with regard to the manner of exposure, accounts for much variation disclosed in test of heat-treated products. Better control of the cooling process is necessary to maintain higher standards of quality and uniformity. Uniform cooling is as desireable as uniform heating, regardless of the metallurgical standard of quality.

✦ ✦ ✦

NON-UNIFORM exposure accounts for irregularity in metal heated and cooled in the form of a coil at, apparently, uniform chamber temperature. The variation is usually due to a difference in method of exposing the individual strand, or the individual coil. Sections of a strand near the outside or center of a coil may be different from sections between these points. Individual coils on the outside of a large mass of coils, or in different sections of a large pot, may likewise vary. Naturally, there is a difference in the time and rate of heating and cooling, in the amount of heat absorbed, and in the effect of the atmosphere, all of which may irregularly influence the structure and surface condition of the metal.

✦ ✦ ✦

Influence of Exposure

THE influence of exposure in heating and cooling is illustrated in Fig. 2, indicating four identical coils placed in different positions within the same chamber. Each coil will heat and cool at a different rate and in a different manner, even though the chamber temperature is uniform. Coil D should show the most favorable result in quality and cost as it can be heated and cooled more uniformly and in less time because of the relatively uniform exposure.

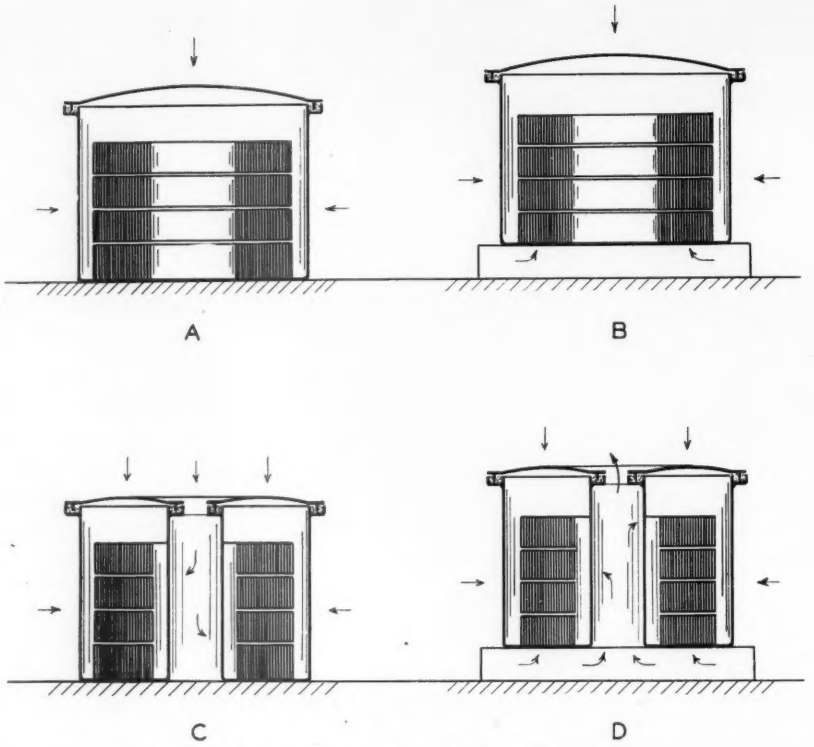

Fig. 3. Different Methods of Heating and Cooling Coils of Metal in Pots

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✦ ✦ ✦

THE same principle applies to mass heating and cooling, as illustrated by Fig. 3, indicating four identical batches of coils heated and cooled in two different shaped pots placed in four different positions within the same chamber for the same time. The rate of heating and cooling and condition of the metal will vary in each case and should be most favorable with Pot D because it has more surface area exposed. It would be unreasonable to expect the same product from each pot, even though the furnace temperature were uniform and all coils were metallurgically uniform when packed in the pots.

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VARIABLE conditions incident to different methods of exposure account for variations in quality and ultimate cost so frequently disclosed in practice without apparent departure from laboratory requirements of temperature. They suggest the need for a better understanding of the relation of indicated furnace temperature to physical conditions affecting time and rate of heating and cooling, which are equally as important as temperature. Temperature is usually determined by the composition of the product and the structural change desired by heat-treatment. Time and rate of heating and cooling vary with physical characteristics of the unit piece or section of the charge, such as mass, surface, shape, section and the method of exposure. The need is evident for better shop practice based on consideration of such variable conditions in order to meet reasonable requirements of uniformity and effect better control of production.

✦ ✦ ✦

Exacting Requirements

EXACTING requirements for uniformity in structure and surface condition of wire and strip metal can best be met by heating and cooling under conditions that provide for uniform exposure of the individual strand or strip. The desirable heat-treating condition for such products is a method of continuous heating and cooling under conditions that will expose

(*Please turn to page 169*)

Electrical Characteristics of Rubber Insulation

By E. W. Davis and G. J. Crowdes, Assistant Electrical Engineers,
Simplex Wire & Cable Company, Boston, Mass.

Properties of Rubber Compounds which Affect Electrical Characteristics of Wire or Cable and Recent Improvements Made in Each are Discussed. A Paper Presented Before the A. S. T. M. Published in Two Parts. Part II. ▲ ▲ ▲ ▲

Electrostatic Capacity and Dielectric Constant

SINCE the capacitance of a wire or cable depends upon the thickness of insulation, conductor diameter and length, a statement as to the capacitance of a particular wire will not give a direct indication of ability of the insulation to hold a charge. Another property known as the dielectric constant or specific inductive capacity is necessary. It is defined as the ratio of the capacitance of a given condenser with the insulating material as a dielectric to that of the same condenser with air as a dielectric (the dielectric constant of air= 1.0).

✦ ✦ ✦

THE dielectric constant of an insulator is a most important property and one which if given suitable study and thought can be used as a definite indication of quality. Rubber compounds possess an added advantage over other types of insulation in that the dielectric constant can be varied over a wide range of changes in compounding. However, in the past little or no recognition has been given to the tremendous value of the dielectric constant in the practical field of insulation. Heretofore it has been more or less an academic property which, except in the design of telephone and telegraph cable, has been little considered.

✦ ✦ ✦

THE dielectric constant of rubber compounds is extremely sensitive to impurities, moisture and poor compounding and its measurement is therefore, of great value in manufacture as a means of controlling definitely the quality and uniformity of a product. Fig. 7 shows the variation with cure of dielectric constant of three rubber compounds. Here as in Fig. 6 Compound No. 1 is an old one and behaves differently from modern compounds using anti-oxidants and accelerators. In general the dielectric constant increases very slightly with cure.

The dielectric constant of a rubber compound is extremely sensitive to changes in the structure and will often show sooner than any other property that excessive voltage has been applied. All rubber compounds will withstand quite severe voltage tests without any indication of injury. However, as pointed out under insulation resistance, if cables are tested above the electrical "elastic limit" permanent injury will result. Such injury will invariably be indicated by a permanent increase in capacitance. Moreover, for normal voltage tests it is important that the cable show no change in dilectric constant after the voltage test, since such change would indicate subnormal dielectric strength.

✦ ✦ ✦

CRUDE rubber has a dielectric constant of about 2.50. Rubber compounds contain besides the crude rubber various fillers anti-oxidants and accelerators and can be made with dielectric constants varying from 2.8 to 9 or 10. Many new fields, heretofore impractical, have been opened to rubber insulated cables especially in telephone and telegraph service, where low capacity is essential.

✦ ✦ ✦

WHEN telephone or telegraph signals are transmitted over a cable, the extent to which they are attenuated or weakened depends upon the primary constants of the cable. With all other constants fixed, low capacitance cable will give lower attenuation or loss, which is very desirable, especially for long lines. Up to recent years rubber insulated cables, although used in telephone and telegraph work for a variety of purposes, have in general been confined to short runs due mainly to their relatively high dielectric constants. Within the last few years recognition of this limitation has resulted in the development of low dielectric constant rubber compounds superior to any heretofore available. Compounds with dielectric constants less than 3.0 are now available. These compounds rival gutta-percha, which has been used for so long in submarine cables. Rubber compounds always have had superior mechanical properties from the installation and operation point of view, and the removal of their objectionable electrical features has already allowed their entrance into the submarine cable field. For example, the use of low capacity compounds on a particular type of cable used

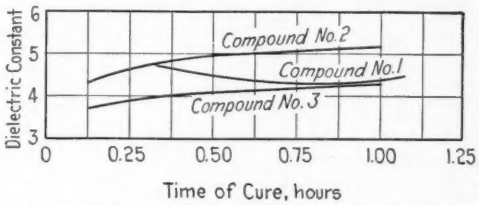

Fig. 7. Variation of Electric Constant with Cure. ✦ ✦

by the U. S. Government has resulted in a decrease of transmission loss of about 35 per cent over that obtained with ordinary 30 per cent rubber compounds. This reduction was obtained at practically no extra cost and, in addition, other properties of the compound indicate a much longer service life.

✦ ✦ ✦

OZONE is formed when air is stressed beyond its "critical disruptive gradient." In contact with rubber compounds ozone combines chemically with the rubber hydro-carbons to form an ozonide. The result, especially if the cable is bent and the rubber under tension, is the familiar "ozone cutting" and rapid failure of the cable. With proper design and low capacity compounds the voltage distribution across the insulation and the air around the cable can be so controlled that the stress across the air is below that necessary to form ozone. By application of this method of stress control rubber cables can be used for services not possible previously.

✦ ✦ ✦

IT has been practically impossible in the past to take any advantage of the classical theory of grading as applied to cable insulation because of lack of suitable insulating materials. As mentioned before, the stress across the insulation surrounding a conductor is not uniform but is a maximum at the conductor surface and a minimum at the outside. By making the cable up in layers of insulation, each having the proper dielectric constant, it is theoretically possible to design a cable having uniform stress throughout or a reduction of maximum stress for a given cable. With the range of dielectric constants now available in rubber compounds and their assured permanence in service, such cable is now possible.

✦ ✦ ✦

Power Factor

WHEN insulation is subjected to D. C. voltage a very small current flows. This current causes an actual, though small, power loss in the dielectric. When A. C. voltage of the same effective value is applied the power loss in the dielectric is very much greater than would be expected from the D. C. value. (See Fig. 4).

✦ ✦ ✦

THE nature of this A. C. dielectric loss is even today not completely understood. The results of recent work with the dipole theory of Debye[1] offer one possible explanation. In materials in which dipoles are present the A. C. dielectric loss is attributed to the energy dissipated by the molecules turning against the friction of the medium. This theory appears to account for the behavior of the rubber under various conditions of temperature, cure, etc., quite satisfactorily.

✦ ✦ ✦

SINCE the actual dielectric loss varies in different cables with the dimensions, applied voltage, etc., another term known as power factor is employed. The power factor is the ratio of the dielectric loss in the insulation to the product of the applied voltage and the total current passing through the insulation. The power factor is in general, independent of the cable dimensions and therefore can be used as a direct means of comparing compounds.

✦ ✦ ✦

THE dielectric loss and power factor of rubber can be determined by measurement of the watts loss or by direct measurement in which the sample is compared to a known capacitance of zero power factor such as an air condenser (bridge measurement). Because of the very low values of the quantities to be measured the latter method is in general more practical than the first.

Power factor is an important electrical property of the rubber insulation on power cables. Since, as mentioned previously, it is a measure of the electrical energy dissipated as heat in the insulation, it is obviously an important factor in the current carrying capacity of the cable. Figure 8 shows the variation of power factor with temperature for a single conductor rubber insulated cable compared with similar paper and varnished cambric insulated cables. It is evident that rubber compounds can be made with power factor—temperature characteristics comparable with paper insulated cables and much superior to varnished cambric insulation.

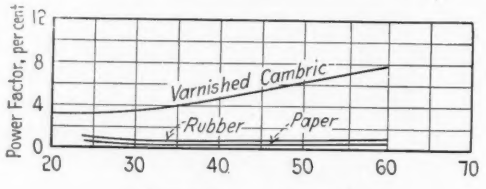

Fig. 8. Variation of Power Factor With Temperature. ✦

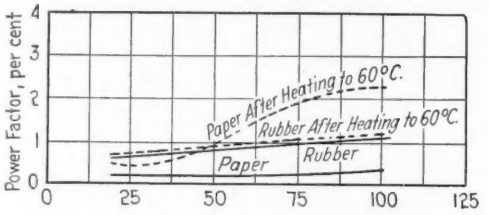

Fig. 9. Relation of Power Factor to Stress. ✦ ✦ ✦

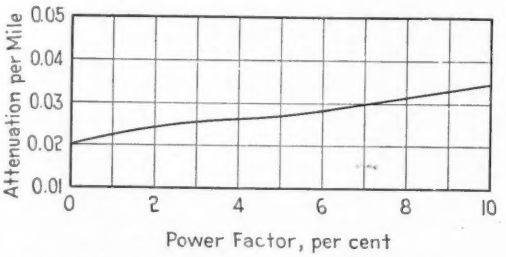

Fig. 10. Relation of Attenuation to Power Factor on Continuously Loaded Rubber Cable. ✦ ✦ ✦ ✦ ✦

THE variation of power factor with voltage is of considerable value because it can be used as a measure of the freedom of the insulation from gas pockets. Increasing voltage stress ionizes the imprisoned gas and causes a marked increase in the measured power factor. If the power factor—voltage curve is very steep or shows an abrupt increase in slope it is a reliable indication of air pockets but the complete interpretation of a moderate and fairly uniform in-

crease in power factor is often difficult.

✦ ✦ ✦

FIGURE 9 gives data on the power factor voltage characteristics of rubber and paper insulated cable of the solid type before and after being heated up to 60° C. It can be seen that the rubber insulated cable returns practically to its original condition. The change of the curve for the paper cable after heating is due to the realignment of voids and expansion of lead sheath of the sample. This is perhaps an extreme case. Nevertheless such a condition is not improbable in the course of the service life of a paper cable, especially where there is any chance for migration or loss of compound.

Power factor is also important in rubber insulated telephone cables. High power factor means high energy loss or absorption in the insulation, greater signal attenuation, and consequent decrease of the maximum distance over which signals can be transmitted.

✦ ✦ ✦

FIGURE 10 shows the effect on the attention of varying power factor for a rubber insulated submarine cable with continuous inductive loading.

Besides these instances of the practical value of power factor, it is of service as a tool for research into the structure and behavior of rubber compounds. Study of the relations between power factor, frequency temperature, sulfur content of the rubber compound, etc., is yielding results of great interest and considerable ultimate value.

The power factor of rubber compounds is under close control, and consequently it can be used as a reliable indicator of uniformity and for factory control of quality. Research is continually showing how the power factor of rubber compounds cn be reduced even further than the values shown, and thre is nothing to indicate that the ultimate limit has been reached.

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Permanence or Life

Permanence or life, here listed as a property of a rubber compound, is of paramount importance and is a direct measure of the years of serviceable life which may be expected from a wire or cable. The changes which both the electrical and physical properties undergo throughout the period of service determine the permanence of the rubber compound as an insulator. For each particular type of service there are certain electrical or physical properties which must not change appreciably.

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IT is of primary importance from the operating standpoint that rubber compounds should retain their original excellent electrical properties throughout the period of useful life.

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FOR wire which is to be used under dry conditions the electrical properties vary approximately with the physical properties, and if a compound is designed to age little in air or sunlight, it will also retain its initial electrical properties.

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IN this paper have been shown the tremendous improvements made in the electrical characteristics of compounds. The fact that such improvements are also accompanied by equally great advances in the physical ability of rubber compounds to withstand the deteriorating influence of service conditions aspermanence than ever sures a greater degree of before attained.

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Water Absorption

THE contrary is true for compounds which are to be used submerged in water or subject to any moisture or wafter, such as on buried cable, etc. In such cases the electrical deterioration may have absolutely no connection with the physical condition of the compound. The change in electrical properties in this case would depend solely upon the water absorption characteristics of the material. The permanence of the original electrical characteristics is in general dependent upon the amount of water absorbed.

The general idea that rubber is impervious to water is not strictly true. Rubber compounds will absorb from ¼ per cent to several per cent of water by weight, and it is only by proper design and choice of materials that extremely low water absorption can be obtained. It is obvious that a low rate of water absorption is essential for rubber compounds which are to be used for submarine service.

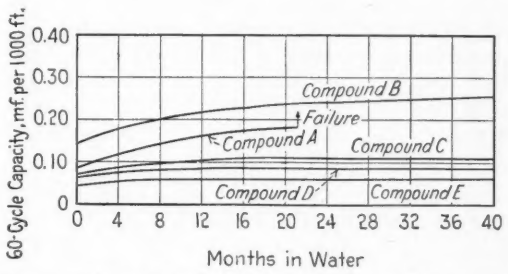

Fig. 11. Relation of 60-Cycle Capacity to Time in Water. ✦

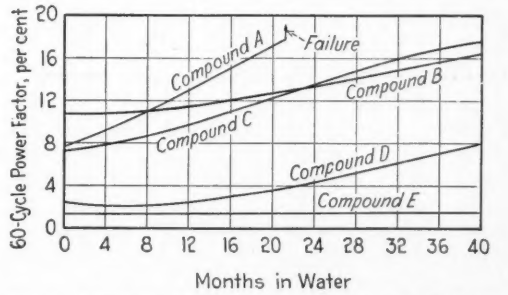

Fig. 12. Relation of 60-Cycle Power Factor to Time in Water.

RUBBER cable is taking an increasingly important place today in the field of submarine telephony and telegraphy. It is being used in place of the more expensive gutta-percha which ten years ago was considered far superior to rubber because of its remarkable ability to withstand water penetration. For such service permanence of electrical properties is quite serious since the transmission quality is dependent on the

(*Please turn to page 161*)

Wire Galvanizing Processes

L. D. Whitehead
Whitehead Hill & Co. Ltd., Cwmbran, Mon. England

The final paper of a discussion on
HOT GALVANIZING VS. ELECTRO GALVANIZING
between Mr. L. D. Whitehead of Whitehead, Hill & Co., Ltd.
and Mr. G. K. Rylands of Rylands Brothers, Ltd.

Mr. Whitehead concludes the discussion.

At the conclusion of this series of articles Mr. W. H. Spowers, Jr., well-known consultant on galvanizing, will review the controversy. This review will be published in the July issue of Wire and Wire Products.

IF what Mr. Rylands stated, in the opening paragraph of his second article on the galvanising of wire, concerning the efficiency of our methods and organisation, is correct, it would appear to be inconsistent for us to be putting forward claims, after five years' patient and costly research work, for our process of galvanising unless we were sure of our ground.

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WE have suggested that the relative merits of the Crapo process and electro-galvanising by our method should be submitted to a strictly independent investigation, and it is unfortunate that Mr. Rylands did not accept this suggestion. I think it will be generally agreed that where one manufacturer wishes to criticise publicly the products of another, such criticism should be based on independent investigation and not on uncontrolled works tests. What I have stated is based on investigations carried out at the Birmingham University under conditions which were such as to ensure that these investigations should be absolutely independent and impartial.

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I must take exception to Mr. Rylands's reference to my retinue of "experts"; he is not entitled to use such an expression when referring to an investigator of Mr. T. H. Turner's repute, and throughout he seems unable to tolerate any opinion outside the limited horizon of his own laboratory, or any method of investigation which differs from his own set practice. The same spirit is shown towards my suggested amendment of the specification for the galvanising of wire. He admits that the present specification is unsatisfactory, but is apparently unwilling to assist in its amendment. If we are searching for the most perfect method of galvanising wire, we can hardly expect progress along such lines.

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The Importance of Preliminary Preparation

IN the preparation of the surface of our wire before galvanising our methods are equal, if not superior, to those of the Crapo process. The surface preparation is a vital factor in successful galvanising, and is in general practice in the United States. From this point on our process is definitely superior to the hot process, as we set out to produce a galvanised coating consisting of a pure zinc, which is closely adherent to the base metal. The object of the purity of the zinc coating is twofold; firstly, its greater resistance to atmospheric corrosion, a fact which is confirmed in "Rylands's Review" of February 1931, where the following statement will be found on page 2:—

"Pure zinc has long been recognised as the best protection for iron and steel against corrosion."

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IT seems strange that Mr. Rylands should now wish to set aside this definite expression of opinion on the part of his firm by quoting Professor Ulrick R. Evans's views to the contrary. I am quite aware there is a cleavage of opinion on this point amongst various authorities but our claims do not in the main rest upon this factor, as our second object—which is of vital importance in wire subjected to severe bending—is the greater ductility of pure zinc over a zinc-iron alloy such as is produced under all hot galvanising processes.

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DR. W. S. PATTERSON, whose opinion has been referred to by Mr. Rylands, makes the following recent statement in a paper published in *Sheet Metal Industries*:—

"Attention should be drawn to the fact that as between hot and electro galvanising the character of the work must largely determine which should be used. In the case of galvanised wire, for example, there is an obvious reason why the electro process should be used, that is the fact that the pure coating so obtained is more ductile than the impure and relatively brittle coating obtained by hot galvanising."

In this opinion, he is supported by other well-known authorities.

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ON this point, and also on the question of the adherence of the coating to the base metal, I may say that we draw 25 per cent of our production after galvanising without any loss through the stripping of the coating; we also manufacture staples from the galvanised wire without any peeling or cracking due to the shock of machine bending, and the ductility of the zinc is such that it actually

flows over the points of the staples in their formation. During the last nine months we have not had one single pound of galvanised wire rejected on account of any defect in the galvanising. Such results in actual use are far more conclusive than any of Mr. Rylands's tests and amply comply with his definition:—

> That the efficiency of one's production depends on the general quality of one's output.

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The Verdict of Rejections

IF his results were truly representative of the quality of our galvanising, the rejections would instead have been extremely heavy; it is hardly likely that we should have wasted time and money in producing inferior material. It is somewhat strange that, although our wire has been submitted to independent investigation at the Birmingham University and by several of the consumers of the highest grade galvanised wire, it is only in Mr. Rylands's investigations that any adverse report is made.

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I WILL now show why the procedure adopted in his investigations is unsatisfactory, and can scarcely carry conviction. The first point is that we do not agree that the sample coils of our electro-galvanised wire were purchased under the circumstances he mentions. We can state quite definitely that these coils do not represent our wire to a four one-minute dip specification, such as we are regularly supplying to customers without any complaint. Although we have made searching inquiries, we cannot trace how the confusion, which has obviously taken place, occurred. Judging from the description of the colour of the wire and its behaviour, it points to the conclusion that Mr. Rylands must have inadvertently got hold of some coils which were produced prior to our continuous process and, further, were not to specification. If he cares to send an independent inspector to our works, we will galvanise wire in his presence, both to two and four one-minute dips. Half of these coils we will retain ourselves, and the other half will be handed over to the inspector for delivery to Mr. Rylands. We are quite confident that when these samples are examined it will be found that our claims are fully substantiated. In making this offer, I do so in order to give an opportunity to Mr. Rylands of satisfying himself, but at the same time I consider the only means of obtaining a definite ruling on the respective merits of the two processes is by a strictly independent investigation, and this course is still open.

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Comparisons Should Be Like With Like

SECONDLY, the investigation shows that the comparison was that of *five* samples of our wire to a specification, against *one* sample of Crapo wire to no specification. This is unsatisfactory, as the comparison was not like with like, either in the specification or in the number of samples, and his one Crapo sample might have been, just as likely as not, above specification as below. Here I do not consider Mr. Rylands has been quite fair in using in his second investigation the same sample of Crapo wire as in his first, which he already knew from his previous tests was above specification.

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NOW let us examine his new figures. It will be recollected that I put forward in my last article an analysis of his first copper-sulphate and acid stripping tests, which showed amazing contradictions. He now submits a fresh series of figures in which he eliminates these contradictions. Whilst this might be considered significant, he wrecks this part of his case by attempting to show that both sets of results are correct, and this is obviously absurd.

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I AM not in the least surprised at these contradictory results, as the method he had adopted of ascertaining the "Percentages of Coat" and the "Uniformity of Coat" is a crude and unreliable one. The only accurate method is by dissolving the coating and ascertaining the amount of zinc in solution per known weight of wire. It is for this reason that stripping in acid, as described by Mr. Rylands, is an unsatisfactory and unreliable means of testing, apart from the well-known fact that the reaction of acid on a zinc coating varies considerably according to the degree of purity of the zinc. Our retests, on the samples which were returned to us, under these more accurate methods, confirm this unreliability.

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I WOULD ask Mr. Rylands whether he seriously suggests that stripping tests on the same class of wire using sulphuric and hydrochloric acid have any value whatsoever, when on his own showing Sample No. 1, with a mean coating of 1.51 per cent, takes 180 seconds in sulphuric acid and 100 in hydrochloric, whilst Sample No. 2, with a mean figure of 1.21 per cent coating, takes 140 seconds in sulphuric and the quite unexpected result of 130 seconds in hydrochloric. Mr. Rylands's own finding shows that to place any reliance on these methods is futile.

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The Effect of Certain Tests on the Steel

MR. RYLANDS has overlooked in his drastic wrapping and unwrapping tests the effect on the steel. Unless this is of the highest quality, the surface of the steel under this test is inclined to break up and so disturb or penetrate the zinc coating. This is a question of the quality of the steel rather than that of the galvanised coating, and is no fair criterion of the latter.

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IT is claimed that enormous variations were discovered in the thickness of the coating under our process at different points in the same coil. Now, if his figures are examined—take, for instance, sample No. 2—it will be found that under the Preece test his three results on this coil of wire are the same, and yet his figures on the uniformity of the coating vary as much as three to one. The same thing applies in a rather less degree to all other samples, except, possibly, No. 4. Obviously one of

these two tests is wrong, and as the Preece test is a comparatively simple one to carry out, and moreover a generally accepted test, all these stripping tests results afford is merely further evidence of their unreliability. As a matter of fact, under our continuous process, with its perfect control, such variations in the thickness of the coating are not possible, and I can guarantee that on a run of galvanising, say 50-100 tons of wire, the variation in thickness will be far less than by any system of hot-galvanising. The only possible difference in thickness is in changing over from a specification, say, of two to four one-minute dips, and this only affects one set of coils, which are set aside for two one-minute dip orders.

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WITH regard to the flaking off of the electro-galvanised coating in the acid stripping test which is reported, whilst we have seen such a thing happen in the earlier stages of our experimental work, due to the surface of the wire not being uniformly cleaned, we have never come across such a case under our continuous process where every inch of the wire is treated alike.

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Laminated Structure Under the Lens

I PASS now to Mr. Rylands's investigations by means of microexamination, to which he devotes the greater part of his article. Dealing firstly with the laminated structure of our electro-galvanised coating, there is no question of our endeavouring to make the "best" of this, as is rather unkindly suggested. The presence of these laminations is definitely advantageous to the coating, whereas the presence of iron in the form of zinc-iron, which is unavoidable in hot-galvanising, is distinctly to the contrary. This point was not dealt with in my first article, which, owing to its comparatively short length, was confined to the general principles of electro- and hot-galvanising and did not enter into such details. The inclusions between these laminations, which are claimed to be detected, do not, in fact, exist, and are merely the tiny cavities scoured out in the course of polishing a soft metal in conjunction with a hard metal.

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I WOULD like your readers, especially those with experience in photomicrography, to compare Mr. Turner's photographs, as given in Fig. 1 of my article, with those of Mr. Rylands in Fig. 1 of part 1 of his article. It will be observed firstly that Mr. Turner's photographs, in spite of the lower magnification, clearly show up the main features of the various coatings; secondly, the photographs show great uniformity and no scratches, thus indicating that great care had been taken in the preparation of the samples, and in the proper focussing for exposures. On the other hand, Mr. Rylands's photographs show no uniformity either in the preparation of the samples, some of which show bad scratching and "scouring out" of the zinc coating in polishing, or in the photography, where the object is obviously out of focus in several cases. Whatever the methods employed in the preparation of these samples, the results are not comparable among themselves and convey nothing definite owing to poor technique in polishing.

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AS another example, let me refer to Fig. 2; here we have the only photograph of Crapo wire in comparison with electro-galvanised wire. Even to those not initiated into the finer art of photomicrography, glaring differences in the preparation and photographing of these two samples must be apparent. In the Crapo wire, the whole object is out of focus, and no detail of the structure of the coating is apparent, and even the inner coating of zinc iron, which is so clearly shown up in Mr. Turner's photograph, is scarcely discernible. Whether cracks exist in the Crapo sample, it is impossible to say, in the absence of any detail of the structure of the coating; with regard to the electro-galvanised sample, this photograph is so distorted in preparation that it is difficult even to distinguish between the coating and the white metal, and no one could definitely state from this whether cracks exist or not.

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The Reason for the Oblique Cut

MR. RYLANDS criticises Mr. Turner's method of using obliquely cut samples, and suggests that in consequence the features of the coating have been badly distorted. Here he is wrong, because this method of preparation is accepted practice in the examination of coatings of zinc, tin, and other metals. His simile of photographing a church steeple with the camera tilted upwards does not apply, as the photographs of such obliquely cut samples are taken at a true right angle to the cut. The purpose of this method of preparation is two-fold; first, it exposes a greater surface of the zinc coating to examination, and so brings out the main features of the coating without employing unnecessarily high magnifications, under which it is difficult to bring the whole field into proper focus; second, it lessens the great difficulty of polishing samples of two metals in close conjunction, which differ greatly in hardness, such as steel and zinc, without causing a "scouring-out" or step between the harder and softer metals.

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ANY experienced microscopist will see at once that the thick black band which appears in so many of Mr. Rylands's photographs, both between the steel base and the zinc, and between the zinc and the white metal in which it is embedded, is not an oxide inclusion, as he would have us believe, but merely the shadow cast by the steps caused in the polishing of three metals of different hardness in conjunction with each other. If reference is made to Figs. 4 and 5, it will be seen that this dark band appears on both sides of the zinc, and of rather greater thickness on the outside.

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TO prove this on the basis of *reductio ad absurdum* I would refer to Fig. 1, where in sample No. 2 .002 m/m thick these dark bands merge practically over the

whole area of the coating. If Mr. Rylands's interpretation of such photographic results is correct, then in this particular sample the whole coating is an inclusion of some salt which would be readily removable on rubbing, and attention would have been drawn to it as such. Again, if reference is made to the wrapping test and to the Preece test applied after unwrapping of this sample, it will be seen it passed both these tests without any diminution in the results obtained in the first Preece test on the wire in the straight. It must under these circumstances be obvious that such results could not possibly be obtained if actually there were inclusions.

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OBSERVE next the difference in the thickness of the dark band in these two illustrations: In Fig. 4, where the sample is finally polished parallel to the coating, the thickness is less than in Fig. 5, where it is finally polished at almost right angles. If these bands were zinc oxide, then the thickness would not be affected whatever the direction of the polishing might be, but in this operation the apparent width of the step varies considerably according to the direction of the final polishing; hence the difference which I have pointed out. This same variation, according to the direction of the final polishing, also appears in the photographs in Fig. 1.

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ANOTHER point is that if his theory were correct and the dark bands were actually zinc or any other oxide, it would be quite impossible to plate firmly on the top of such an inclusion. To confirm this, Mr. Rylands need only refer to the practical electro-plater of any metal. I would also make reference to Fig. 3. Here the only thing in focus is the step between the steel base and the zinc coating. The heavy scoring of the steel base, and the lesser scoring of the zinc coating, emphasises how the latter has been "scoured out."

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NOW I will analyse Mr. Rylands's conclusions. He has made serious allegations regarding galvanising produced by our continuous process of electro-galvanising. He states, "I have adduced conclusive evidence that Mr. Whitehead's electro-galvanising is not pure zinc, and that it does contain non-metallic impurities." He goes on to state that he has not proved or disproved that these inclusions are zinc oxide, and I am entitled to question whether it is any other oxide or any inclusion at all? In the paragraph previous to his conclusions he challenged Mr. Turner on his opinion that chemical analysis is not of any value in dealing with galvanising, where the coating varies in its composition, as in hot-galvanising. If this is the case, why does he not use such chemical analysis to prove his case? On examining his conclusions still further I find the use of the words "possible" or "probable" occur no fewer than six times. This marks the great difference between Mr. Rylands and myself, as I have, throughout my articles on the subject, expressed the opinions of those responsible for the various investigations on our behalf without any qualifications.

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I HAVE always regarded as one principle in business success that of being open to conviction as to whether one is right or wrong in one's preconceived ideas, and so framing one's policy. After five years' research work I have come to the definite conclusion, in the same way as Dr. Patterson has, that, for the galvanising of wire, elctro-galvanising gives the best protective coating.

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Spectrum Analysis is Reasonably Foolproof

AS to my suggestion of examination by spectrum-analysis, that removes any question of the skilful or unskilful preparation of the samples in photo-micrography; a very real factor in dealing with a soft metal coating in conjunction with a hard metal base. The preparation of samples for spectrum-analysis requires no great skill, as it is only a question of bending to shape. From this point on, spectrum-analysis is reasonably foolproof, and the results are definitely recorded in a spectrogram without any qualification of "possible" or "probable." Such spectrograms show quite definitely and beyond dispute which metals are present. It is possible by this means to take, with greater accuracy than by any other method, the composition of the coating at each point in sequence.

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THE question as to whether the metal present is in the form of a metal or a compound is not of great importance, as Mr. Rylands states that zinc in the form of zinc oxide is an even better protection against corrosion than pure zinc. I do not quite agree with him in this one respect, as such an inclusion unless minute in proportion, would lessen the ductility of the zinc or adhesion of the coating, hence the physical tests I have suggested in my proposed specification to meet this point.

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UNDER modern conditions spelter can be produced of such reasonable degree of purity as not to affect the quality of the galvanised coating. This narrows down the sphere of investigation, and it is only necessary to look for those causes of contamination which arise in course of galvanising and lessen the value of the protective coating. The most serious contamination, which is well known to those who have investigated the subject, is the remarkable affinity between zinc and iron. In the hot process this is picked up firstly in the iron or steel bath in which the spelter is in a molten state, and secondly, during the coating of the iron or steel wire. In electro-galvanising there is no such contamination. This is the vital difference between the two processes, as the presence of iron in the shape of an alloy with the zinc causes the latter to lose a great deal of its ductility, and so renders the hot process less suitable for the galvanising of wire than the electro-deposition process. Electro-galvanising, as we found it, was a dubious proposition, but we set out to remove its defects—mechanical, chemical, and electri-

(*Please turn to page 166*)

Wire Association Program for 1932 Meeting

An outline of the program for the coming Wire Association meeting to be held at Buffalo, N. Y. in October, 1932., as decided upon at the Directors' meeting held at the Hotel Pennsylvania on March 3rd, 1932. ▼ ▼ ▼ ▼

THE annual Directors' meeting of the Wire Association was held at the Hotel Pennsylvania, on March 3, 1932, ten of the 14 Directors being present:

Mr. John Mordica, Supt. of the Rod and Wire Works, Bethlehem Steel Co., Sparrows Point, Md., President of the Wire Association presided as Chairman and Mr. Richard E. Brown, publisher of WIRE & WIRE PRODUCTS, and Secretary of the Wire Association acted as Secretary for this meeting.

Many matters of interest relative to the conduct of the affairs of the Association were discussed in detail.

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Membership Programme

THE Treasurer's report for the operating period ending February 29, 1932, was first presented, discussed and approved and in this connection the question of developing members was taken up and an interesting discussion of the best means to accomplish this followed. As a result it was decided to form a Membership Committee with general divisions, one for steel and one for non-ferrous and the Secretary was instructed to proceed with organization of such a committee and to assist them in instituting a Membership drive.

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Discussion of Program for 1932 Meeting

THE Program Committee for the 1932 meeting reported its progress to date through Mr. R. K. Clifford, General Supt. of the Continental Steel Co., Kokomo, Ind., Chairman, and a discussion as to the best method of conducting the forthcoming meeting in order that some really profitable discussions might be developed followed. In this connection Mr. Clifford stated:

"It occurred to me that perhaps it might be well to consider some changes in the method of handling the meetings; not necessarily a change of the meetings, but the way in which the discussions are to be brought out and while I hesitate to inject too much of my personal experience as a member and Chairman of the Open Hearth committee of the Metallurgical and Mining Engineers, still I think the methods used by them in presenting short papers and questions for discussions are outstanding in their success, so much so that "Steel" ran a review recently on these Open Hearth meetings and commented that the information obtained was considerably more than is ordinarily possible at meetings held in the ordinary manner of reading lengthy papers and having to curtail discussions at the most vital stage. I have had considerable discussion with Mr. Lewis and Mr. Pierson on these methods at the meetings and they are much the same mind as I am about this. I think it a good idea to have the opinion of the Board of directors.

"I find that the present method among societies and associations is to present programs principally composed of papers prepared in advance and that at the meetings the members sit around, some of them interested in the papers and some not. I think part of this lack of interest is due to the fact that they know they can read the papers and discussions in print later on at their leisure, and I know this is true in many instances.

"The Open Hearth started out with the idea that the discussion is the main thing and they have a Chairman who prepares a list of questions in advance. He writes to a number of members or all of them and asks each to submit, for discussion, their questions as to what they would like to obtain information on and would like to hear discussed. It is really surprising the number of questions which are sent in and how much discussion comes from these questions. One of the reasons why methods of this type are so successful is that all have something to say.

I think we all realize that this is the value of meetings, where the men who would not or do not care to prepare a paper for discussion, attend, when we ask them a direct question as for instance—"What is the best method of cleaning rod?", "What strength acid to use?", etc. If you or anyone else answers such questions and your reply arouses the opposition or anger of anyone there, they hasten to get up and express his or their own opinion. They do not always tell a lot, or tell all they know, but you can always pick out the best questions and discussions and reply to them.

"The Open Hearth meetings did not have any papers at all when first started they just got together and discussed, but now they start with a short paper and the discussions are built up around the paper. For instance, they might have some discussion as to the proper thickness of ingot molds. The Chairman has arranged for a paper on ingot molds and directs

the discussion and questions asked as the paper is read and brings out the discussion.

"I know that all the men who participate are very enthusiastic and it relieves the program committee of a lot of responsibility in preparing a list of papers ahead of time. For instance, suppose Mr. Lewis were Chairman, he in turn knows a number of men and what products they make and when discussions arose along certain lines he would know what men to call on for answers to questions, etc."

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IN the discussion that followed, Mr. Mordica stated:

"At a recent meeting which I attended there were no papers read and a one day meeting ran into a two day session when these discussions were held, but I also think it a good idea to prepare a list of questions and have some one to preside and ask the questions and get others to talking about them and have the facts and answers brought out by asking questions of those who would know the answers."

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MR. Kenneth B. Lewis of the Morgan Construction Co., at this point said:

"This gives me a chance to "chisel in". This illustrates the point we are trying to show. I received a question on the speed of Nail tumblers not long ago from the Wire Association. I answered it and so did Mr. Clifford. (Many other replies were received to this same question by the Association). This would make a good question for discussion. One fellow will get up and say he runs his at 38, another will say he runs at 48, there is not great value to a discussion of this sort because no one knows just why he runs at this speed. The best way to run a group of these facts into a discussion would be for some one to start out by making a statement that he has done either one of two things, either by stating the result of some careful experiment or by setting up a theory.

"I dug into the matter of nail tumbler diameters and set up a theory and wrote an article setting forth the theory, which may or may not be correct, as to how fast nail tumblers may be run. I think this will lead to a discussion of the subject as it will be printed in WIRE & WIRE PRODUCTS and I personally feel that the way to start a discussion is to have a brief paper or papers prepared and set forth the result of some experience or set forth a theory, and this will bring forth a number of questions or replies from 12 or 14 people who do know about the questions involved.

A chairman to present these papers and keep the discussions and questions lined up and directed in case they begin to lag or take the wrong direction, is the most satisfactory way to conduct these meetings in my opinion.

"The Chairman could say, "J. M. What do you think about this?", so that he might have something with which to push the discussion into the open. I do think we should have papers about which discussions can take form, directed by the Chairman, who can always get back to his list of topics and start another question or discussion."

Mr. Clifford agreed with this idea saying: "I think the idea of preparing a list of questions for discussion and distributing them among the men who would be prepared to answer and discuss them at the meeting in October is a good one. Such a list to be prepared by the program committee."

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AFTER a general discussion in which all the members of the board participated. The program committee was instructed to prepare and carry out the 1932 program, along the lines they had indicated: Three days devoted to presentation and discussion of papers. Each day's session to be presided over by a different chairman. Mr. Lewis the first day (steel); Mr. Pierson the second day (non-ferrous and insulated wire and cable), Mr. Clifford the third day (general discussion).

Each day to have two papers presented, one in the morning and one in the afternoon with the bulk of the time devoted to discussions. The Chairman to plan in advance for the presentation of certain questions to be discussed in connection with each paper.

The exhibition and show to be in charge of Mr. Brown who is also to secure such motion pictures as it may be decided to present.

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ALL papers are to be in the hands of the Chairman of the Program Committee on or before July 1st, 1932 and from that point on—the Program Committee will build up a series of questions for discussion and submit them to the membership through the medium of WIRE & WIRE PRODUCTS at least a month before the meeting. In this manner a most instructive and interesting program will be had.

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IT was decided to have all who attended these sessions pay a registration fee of $5.00, and to extend a general invitation to all wire men to attend.

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IT was decided that copies of papers were to be published in WIRE & WIRE PRODUCTS but that copies of the discussions were to be furnished separately and only to members and others who paid their registration fee and attended the sessions. This is designed to secure new members from among those who would like to study the discussions further.

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War Department Wire Requirements

MR. L. D. Granger of the Wickwire-Spencer Steel Co., read and explained in detail the proposed plan of cooperation between the Association and the Wire Procurement Divisions of the Army and Navy, outlining the arrangement which had been made with the War Department to publish the Department requirements in WIRE & WIRE PRODUCTS. Mr. Granger further stated that all members of the Wire Association and advertisers in WIRE & WIRE PRODUCTS were now on the

(*Please turn to page 164*)

Winco PRODUCTS

Leak Proof ▲▲▲

Enameled Magnet Wire ▲▲▲

For Radio and Ignition Coils ▲▲▲

▲▲▲ All wire meets the highest requirements ▲▲▲

Our special method of enameling produces an unequalled product for all buyers of magnet wire. ▲ ▲ ▲

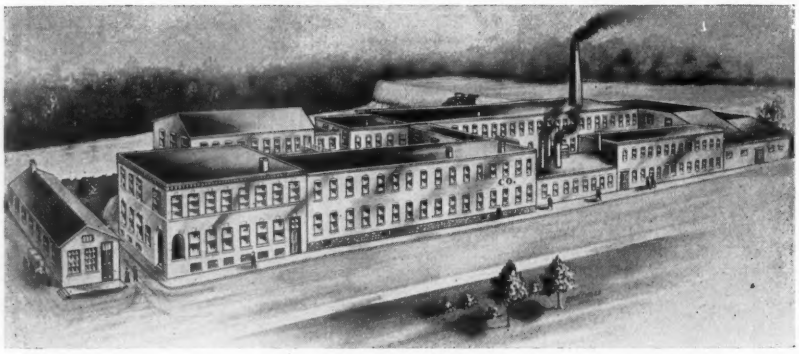
The compound used for coating the wire is the best grade of gum enamel made by expert varnish makers. This compound in connection with a recently developed coating method allows of a uniform smooth flexible coating of great adherence and of a build well in excess of A. S. T. M., A. I. E. E., General Electric, Otis Elevator, R. C. A., and Westinghouse specifications. ▲ ▲ ▲

The Electrical properties of the enamel film are also well over the requirements of the above mentioned specifications. ▲ ▲ ▲

The continuity of film has heretofore not been equalled. ▲ ▲ ▲

The best grade of metal bound spools are used and the spooling is such as to allow of free unwinding whether taken off in the usual way by revolving the spool or taking the wire over end from a stationary spool. ▲ ▲ ▲

The perfection of the enameling equipment and process gives well filled spools of one piece wire even in the finer sizes. ▲ ▲ ▲



GENERAL VIEW OF PLANT, WINSTED, CONN. ▲ ▲ ▲

Products of leakage currents attack insulation and shorten the life of the coil. ▲ ▲

The only test indicating what the leakage loss in a winding may be is the test in mercury, which reveals the weak spots in the enamel covering. ▲ ▲ ▲

Our method of testing all wire by mercury test before shipment is calculated to give the user the highest degree of protection. ▲ ▲ ▲

ALL Winco PRODUCTS WIRE

GUARANTEED LEAK PROOF ▲ ▲ ▲

We would be pleased to quote on your requirements.

WINSTED INSULATED WIRE COMPANY

Incorporated

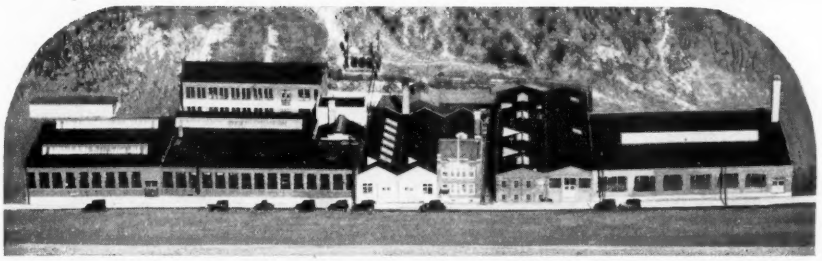
Winsted, Connecticut

HUDSON Copper Wire ▲▲▲

Specially Processed ▲▲▲

For Enameling Purposes ▲▲▲

▲▲▲ High Conductivity Electric Wire ▲▲▲



AERIAL VIEW OF PLANT OF HUDSON WIRE CO., OSSINING, N. Y. ▲▲▲

The copper wire used for Winco PRODUCTS leak proof enameled magnet wire is drawn by the Hudson Wire Company of Ossining, N. Y., who have been specialists in the manufacture of fine wires for over thirty years. ▲▲▲

The best grade of copper drawing stock is used, insuring the maximum conductivity. ▲▲▲

A special process for drawing is used which produces a wire unusually smooth and clean and especially suitable for enamelling purposes. ▲▲▲

Painstaking care in the selection and maintenance of dies guarantees a product accurate to gauge and resistance. ▲▲▲

You can rely on Hudson wire always. ▲▲▲

Expert annealing of the wire prevents unnecessary breakage when winding the wire into coils. ▲▲▲

If you, too, have a specific problem demanding wire of exact requirements, write to us about it. ▲▲▲

It costs nothing and involves you in nothing. ▲▲▲

Better wire at lower cost. ▲▲▲

And These Other HUDSON Fine Bare and Special Wires

Copper...High Brass...Low Brass...Pure Tin...Cadmium...Bronze, Various Grades...Lead ...Zinc...Commercial Bronze...Phosphor Bronze...Silver Plated Copper...False Gold... 10%, 18%, 30% Nickel Silver. LAHN-False Gold...Copper...Silver Plated Copper. BRUSH WIRES...CRIMP and STRAIGHT...Brass...Steel...Copper...Nickel Silver...Phosphor Bronze.

▲▲▲ Metallic Fibre for Packing Purposes ▲▲▲

We can serve you quickly and economically.
Send in your specifications for a quotation.

HUDSON WIRE COMPANY

Ossining, N. Y.

Estab. 1902 — Successors ROYLE & AKIN — Estab. 1902

Pin and Sewing Needle Manufacturing

A Description of German Processes of Manufacturing Pins and Sewing Needles. Translated from "Draht-Welt" by Kenneth B. Lewis, Wire Mill Engineer, Worcester, Mass. ▲ ▲ ▲ ▲ ▲

JOHANN HEINRICH JUNG, sometimes called Stilling, a friend of the poet Geothe, himself a writer whose novels have long since been forgotten, in his youth visited some of the manufacturing centers of his district and has left written descriptions of the operations, among others, of wire drawing mills, and shops making pins and needles. He writes in 1777 of the industry as practised at Altena in Wesphalia.

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THE wire drawing machinery described by Herr Jung is of the type shown recently in these pages, consisting of tongs given a reciprocating motion by systems of levers actuated by cams on the shaft of a water wheel. As might be expected his attention was all engaged by the machine. The dies escaped with scant notice and cleaning, coating and annealing were dismissed either without comment or with a word or two. One bright spot appears, however, and leads to suspicion that lubrication was being given some thought. "When the wire will no longer go" he says, "it is annealed and dipped in some fluid to prevent rust. I have not been able to learn just how this is done for it is a secret process, but I do not see the purpose of it for the finished wire is packed so carefully that it cannot rust. Would it not be as well to cure the wire in smoke?" The suspicion lingers in the reader's mind that this rust preventing fluid was a lubricant.

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DESCRIBING the manufacture of pins and needles Jung says: "Pins and sewing needles are made of both brass and iron, the former preferably of brass, sometimes of iron. but the latter always of iron. I will describe first, pin making, and of brass, because while the two processes are otherwise the same brass pins have to be pickled and tinned.

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Pin Manufacturing

PINS must be of a definite size, and are described under various numbers which denote their size. The shop has to carry various fine and coarse sizes of wire on hand, and even then has to redraw frequently by hand as market wire seldom has the required accuracy, which must be to a hair's breadth. This drawing is done just as I have already described for piano wire (by hand on twin spools). In order to free the wire from grease and verdigris it is boiled in a solution of tartar, one pound to 60 or 80 lbs. of wire, made up with enough water to cover the wire. After boiling the coils are taken one after the other and thrashed against wooden bars in a spray of water until the softened scale is gone and the wire clean and yellow.

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WHETHER the wire is as bought or redrawn it has taken a set around the spool, and since the pins must be exactly straight the wire must be straightened. This is done on a bench with a free reel to hold the wire and with three iron pins staggered in such a way that when the wire is pulled between them it comes out straight. The operator threads the end through the staggered pins, seizes it with pliers and walks back and the wire as it follows him is perfectly straight. One man can straighten in a day enough wire for 240,000 pins.

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THE wire is now cut into pieces double the length of a pin so as to make it easy for the pointer and polisher who can make two points on the same piece by turning it end for end. The shearing of the blanks is done as follows. The shearman has a wooden block called knee-pad, fastened to his knee with a leather strap. On this block are two upright iron pegs slotted for a long wedge; they are a small hand-breadth apart. He has also a small metal box, or jig, as wide as the length of the blanks and as long as the distance between the pegs, and about an inch high. This fixture has no top and also lacks one of the long sides, so that its side wall goes around three sides only. The man also has a heavy shear. He picks up about 150 coarse or 240 fine wires, lays their ends between the pegs, taps all the ends level with his jig, and clamps them down by wedges in the pegs. Then he slips the jig under the wire ends so that all the ends bear evenly against the back wall, and shears along the edge of the jig so that from 150 to 240 double length blanks drop into the jig and can be dumped into a nearby keg.

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ONE man working in this way can shear many thousands of blanks in a day for the pointer and polisher. For these operations there is an enormous wheel or pulley, 8 to 10 feet in diameter, belted to an iron spindle in bearings so that the spindle can be given an astonishing speed. On

the spindle is a small disk of high grade steel with teeth cut in its face like those of a file. Beside this spindle sits the pointer, with a dish full of blanks. The wheel is turned by a handle, the pointer picks up a bunch of blanks, holds them between his forefingers and thumbs, taps them on a plate to square up the ends, presses them against the disk, and rolls them back and forth a few times between thumb and finger so that they are all pointed. Then he turns the blanks around and points the other ends. He can handle 360,000 pins a day. This operation is followed by a similar one with a finer cut wheel, whose operator just keeps up with the rough pointer.

Now the blanks are double length and must be sheared. This is done with the aid of the jig previously described. The shearman drops a bunch of blanks into the jig, (Of which he must have a number at hand for the different lengths) tilts it back so the points all line up against the back wall, clips the other ends under the wedge on the knee pad and shears along the edge of the jig.

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Putting Heads on Pins

PUTTING heads on the pins is the trickiest job in the plant. A pin head is made up of very fine wire wound around the end of the pin in a spiral. This spiral is made by spinning on a wheel that is not much different from a spinning wheel for wool, and is driven in the same way. At the end of the spindle is a straight wire just the diameter of the pin. This wire passes through a hole in an iron peg so that the peg turns with it. An operator must have on hand one of these pin rigs for each diameter of pin to be made. The "head-spinner" picks out a wire of the right size for heading the pins he is working with, puts a coil on a reel and leads the end through a hole in a piece of wood so he can guide it without cutting his finger, attaches the wire to the spindle pin, spins the wheel, and lays a helix of wire onto the spindle pin. This pin fills up very quickly, the wire is cut, the pin stripped, and the operation repeated. A man makes in a day enough head wire for 288,000 pins.

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CUTTING the spun wire into head lengths is a job requiring skill and long practise, for each head requires exactly two convolutions. The "head-cutter" picks up in his left hand twelve of these helical rolls, taps the ends square with the flat of his shears, and snips off all twelve in one stroke. His output is 144,000 a day. For putting the heads onto the pins there is a very clever machine. Mounted on a bench are two upright slides, and between them on the bench an anvil, of very hard steel, swivelling on a pin. Exactly in the center of the anvil is a half round depression, just the size of a pin head. This means, of course, that there must be a different anvil for each pin size. Up and down in the slides moves a lead weight, and it must run absolutely true, because on its lower side is a steel stamp carrying the other half of the pin-head depression, and the two must exactly register. Leading out of these two depressions are two little channels which must also register, for they are sized to take a pin shaft. The lead weight is suspended from a belt which passes over a roll and leads down to a foot treadle under the bench. Stepping on the treadle lifts the weight, and when the foot is removed it falls.

The operator of this header is usually a woman or child. She sits at the bench, on her left two bowls, one with shafts and one with heads. She picks up a pin shaft and sticks it into the head bowl. At least one head is picked up by the point and she pushes it to the blunt end. Now she shifts the pin to her right hand and while the weight is rising she lays the pin on the anvil, head in the depression, shaft in the groove, and drops the weight. She holds the pin by the point and turns it two or three times between blows. While her right hand is busy at this her left is picking up another blank and head. With this rig a lively girl can head 8,000 to 12,000 pins a day.

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A FIRST class pin shop has one straightener, who sometimes does the shearing as well, two pointers, one head-spinner, one head cutter, 20 headers and one man to pickle and tin the product. This crew of 26 will account for an average of 200,000 pins a day. The gross sales, figuring pins at 1½ kreutzers per 100 is about 50 gulden. Figuring stock, wages, and interest at 40 gulden there is a net income of 10 gulden a day, or 2000 to 3000 gulden a year.

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Pickling, Polishing and Tinning

NOW these pins must be polished, pickled and tinned. Cleaning and polishing is done by boiling up a pound of tartar in water in a kettle with 30 lbs. of pins. The kettle hangs from a chain and is shaken back and forth for an hour, which leaves the pins all polished and clean. For tinning there is a kettle 14 inches wide and 20 inches deep, on the bottom of which rests an iron rack with wires at the corners to lift it. On this rack they put a plate of pure tin about ⅜" thick, and on this a layer of pins to about the same thickness, then another plate of tin, more pins, etc., until the kettle is half full. Then a slightly smaller pack is made up so as to nearly fill the kettle but not have too heavy a lift. This second pack has no rack, but its wires pass under the lowest tin slab.

A kettle load is 51 plates of tin, and about 400,000 pins. The kettle is now filled with clean water and 2 lbs. white tartar and is boiled 5 hours, water being added as needed. The tartaric acid dissolves the tin and plates it onto the pins. The loss from the plates is slight, and when at last they get too thin they are remelted and cast. After 5 hours the pack is removed, the liquor saved for the next batch, and the pins rinsed off in water. Then they are tumbled in a keg which turns by a handle on a spindle, and bran is mixed with

(*Please turn to page 166*)

Wire Questions and Answers

Wire Rope Discussion Invited

SUPPLEMENTING the recent article in WIRE AND WIRE PRODUCTS on the use of wire rope for oil well pumping and the possibility of developing a wide market for wire rope for this purpose, the letter following will undoubtedly be of interest to all wire rope manufacturers.

Mr. Percy R. Clark is of the opinion that a new and broad market is available for wire rope for this purpose and invites discussion.

Replies should be sent to WIRE AND WIRE PRODUCTS.

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Editor,
WIRE & WIRE PRODUCTS,
551 Fifth Avenue,
New York, N. Y.
Dear Sirs:

In the January issue of your esteemed paper you did me the honor of printing my article on wire rope pumping in Roumania.

It has occurred to me that a lot could be done for extending the use of the wire rope for pumping if the various wire rope manufacturers were to pool their knowledge in this matter.

The point we should all bear in mind is that we have primarily to compete, not with one another, but with the rod manufacturer.

The unsatisfactory working of any manufacturer's pump rope is to the detriment of all wire rope manufacturers. What is wanted is to make wire rope pumping more popular—to raise the prestige of the wire rope as a means of power transmission to the deep well pump.

Everyone of us no doubt has gained some special knowledge on the point, but probably we have all more to learn than to impart. We should therefore all be better off if we could communicate our information to one another.

As you will no doubt have observed, in my article I endeavored to lay my cards on the table, having the above mentioned object largely in view, and I may say that personally I shall be very happy to exchange information with any other leading wire rope manufacturer, with a view to our mutual benefit.

I think if we were to get together more in this matter, we could obtain for this particular wire product a new market, and a market which up to the present has been almost monopolized by the rod manufacturer.

The cold, hard, undeniable fact remains that during some twenty or thirty years of pumping, the rod manufacturer has had it practically all his own way in this sphere, the wire rope remaining the slighted step-child.

When we have made the sucker rod line an established factor in oilfield economy, then each manufacturer can, if he wishes, strike out in an independent direction for himself.

You would oblige me by publishing this letter in your esteemed paper.

I beg to remain,
Yours very truly,
PERCY R. CLARK.

✦ ✦ ✦

Question No. 1220--Wire Rope Lubricants

The Wire Association:

"Please advise what lubricants are used in the hemp core of wire rope.

Is a soluble oil ever used for this purpose in American practices?"

Answer No. 1

The Wire Association:

IN reply to your first question as to the type of lubricants used on the hemp core of a wire rope, we might say that this varies in accordance with the type of service which the rope will be subject to. If the rope is to be used for general hoisting work, Petrolatum is generally used. If it is to be used for marine work, such as dredging and anything in which the rope is subject to considerable moisture, a compound similar to crater compound is used. On elevator ropes a compound of a very sticky nature is usually used, in order to prevent slippage of the ropes. This varies with different rope manufacturers, but in general it consists of a heavy tar-like liquid, with a certain amount of graphite mixed with it. When a rope is used under conditions where sand or gravel might adhere to it and cause severe abrasion, the core is lubricated with a very light oil, merely as a rust preventer and slight lubricant.

In reply to your second question as to a soluble oil, we have no record of soluble oils being used in American practices, although we do not see any reason why a soluble oil would not be useful in certain types of work.

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Answer No. 2

The Wire Association:

THE treatment of cores prior to laying up in a rope is a practice largely controlled by the individual superintendents of the various rope shops. Most of the rope shops buy untreated or unoiled hemp cores and subsequently treat them in their own shops. Some core is laid up in the cordage mill on special order in pine tar or pine oil, called tarred cores, and some are treated on special order in the cordage mill by patented process to prevent or counteract subsequent rotting in service where alkaline or accidulated waters are encountered.

The writer is not familiar with the practice of all the rope shops in the country but has knowledge of a number of them that use pre-heated Petrolatum, in which the cores as received from the cordage mill are soaked or impregnated, in some cases with a vacuum system, in others simply by running the cores through heated vats and re-winding. In some cases very finely ground graphite is mixed with the Petrolatum.

There are several rope lubricant manufacturers who make a thinner prepared compound to take the place of the Petrolatum, using various bases and ingredients, but not divulging their formulas.

These cores after treated as above are usually run in the rope closing machine through tanks of heavier heated compounds, usually of an asphaltic or tar base, and are more or less wiped so as to leave a lesser or heavier coating of the compound on the core just prior to being closed into the rope. This coating fills up the interstices of the inner rope structure and helps to keep the initial impregnated core lubricant in place as well as to keep foreign fluids out of the rope structure in service. Subsequent and frequent applications of field lubrication are essential however, as otherwise the interior rope and core lubricants will very soon be forced out and exhausted.

So many different oils and compounds are used by the various shops and by the rope users that no definite practice seems to exist, as it is the practice for each rope shop superintendent, as well as many rope users, to follow his own ideas of proper lubrication, as to the kind and amount for each type of field service.

Wire Questions and Answers

Answer No. 3

The Wire Association:

OUR specifications for fiber centers call for the ingredients of the prelubrication to be, Petrolatum, Degras and Pine Tar.

The cordage companies use cordage oil in making the centers, this is in addition to what we specify.

Whether the oil or grease used as the lubricant would be soluble or not depends upon what the rope is to be used for and what it comes in contact with.

The lubricants used in our centers are soluble, to some extent, in paraffine oil.

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Answer No. 4

I am very glad to note that one of the members of the Wire Association is interested in lubricant used in hemp rope. This is indeed a very important question and one that is generally passed over very lightly, not only by wire rope manufacturers but especially by the users of wire rope, who either do not use any lubricant at all or have an idea that just any kind of greasy material will do.

However, for many years we have been giving this problem close attention, more particularly so in the last three years in which we have done very extensive research work, the results of which were rather surprising and which we do not feel at liberty to make public as we consider it "stock in trade" and more or less a manufacturing secret. I trust you will, therefore, pardon us for not answering this part of your question, directly.

We will say this, however, it is absolutely necessary for any lubricant, no matter what it is, that it be entirely free of acid of any kind on account of its effect on the steel. Preferably, the oil should be neutral. As a matter of fact, the compound we use is a threefold proposition as it contains not only a special, intricate lubricant but a hemp fibre preservative, as well as a steel preservative, in addition to which the process of impregnating the fibres is an intricate one and was finally worked out by us after many different experiments.

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Answer No. 5

The Wire Association:

BOTH greases and oils are used for the lubrication of the hemp core of wire rope. A graphite containing grease, however, has been found to be most satisfactory because the graphite penetrates the hemp core and both protects it against water and permits the hemp fibres to slide over one another without abrasion.

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Answer No. 6

The Wire Association:

WE have your letter of March 1 requesting information on lubricants suitable for the hemp core of wire rope.

We would make the following suggestions: The lubricant should be free from acid, alkali and water; must not dry out under atmospheric conditions but must remain pliable and not tend to crack or peel off. It should not contain soap nor emulsify because of the possibility of coming in contact with acid or alkaline water causing corrosion. It is very important that the lubricant will have great adhesive qualities so as not to be thrown off at high speed. The lubricating qualities should be most durable so that under varying temperatures and loads positive lubrication will be assured. It should be capable of standing high temperatures without evaporation of the light ends on account of the danger of flashing when coming in contact with open fires, etc., to such a lubricant we recommend the addition of colloidal graphite.

The Wire Association is for the specific purpose of improving production methods. It was organized as a clearing house of ideas on technical problems and research work in all phases of practical wire drawing and wire working.

The following inquiries were received from and answered by members of the Wire Association. These inquiries are sent to the Secretary of the Association who acts as a central clearing point, and neither the names of the firms or individuals sending in the inquiry, or of the men or firms replying are divulged without permission.

Join the Wire Association!

✦ ✦ ✦

Answer No. 7

The Wire Association:

REGARDING your question No. 1, it would be difficult to do more than classify rather generally the lubricants that are used in the hemp core of wire rope. Of course the feature of a lubricant, whether for internal or external use on a rope, is to prevent rust and keep the rope pliable. The last requirement could be designated as lubricated.

It is generally accepted that the lubricant should be as free from acid and alkali as possible and usually mineral oil products or tar products are the base of the lubricants, although the tar product does not afford as great lubrication as mineral oil. In some cases a fairly good grade of a finely ground, flake graphite is mixed with the more or less liquid lubricant. The graphite has a tendency to penetrate through the wire strands and afford lubrication and to prevent rust. Of course, where tar is used, it has to be one that is neutralized and as free from acid and alkali as possible.

With respect to question No. 2, as far as we know, a soluble lubricant is never used knowingly. It would be affected by the action of water and moisture and instead of preventing rust, it might cause rust. Also the lubricant would be washed out more easily and probably entirely, under certain conditions.

Most of the wire rope manufacturers using hemp core have a preparation that they make themselves, or have made for them, which is considered more or less a private matter, although we do know that some use lubricating flake graphite mixed with it.

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Answer No. 8

The Wire Association:

ANSWER to Question No. 1. The best lubricant for this is a compounded oil consisting of pine tar and mineral oil. This "lubricates" the inside of the wire rope and the tar and oil being waterproof resists the water and moisture that the rope comes in contact with, thereby preserving and prolonging the life of the rope.

Another advantage, the hemp core saturated with this compounded oil acts as a resevoir and when extreme tension or load is placed on the wire rope it naturally contracts, forcing the oil mixture out into the strands of the wire, which not only acts as a preservative but causes an even distribution of the load; there being no dry or rusted spots in the rope to bind together.

Answer to Question No. 2. Soluble oil is not satisfactory for this purpose due to its nature of absorbing water and retaining it in its mixture in large volume, also because the solubility is created by the use of Alkalis.

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Answer No. 9

The Wire Association:

REPLYING to your inquiry of March 1st, would state that as far as we know a cheap grade of vaseline—petrolatum—is used as a lubricant in the hemp core of wire rope. This petrolatum has a low melting point and when slightly heated becomes semi-fluid so that it is easy to saturate the hemp core as it passes through a box or container holding the petrolatum. We have never heard of a soluble oil being used for this practice, and personally we would not consider it a satisfactory product to use.

The lubricants used in a hemp center for wire rope are usually a coal tar product and we have never heard of any soluble oils having been used for this purpose.

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Information is Wanted on The Questions Following

Question No. 1201

"We are having difficulty in avoiding the oxidization loss of calcium when mixed into moulten lead for cable sheathing purposes. We have tried to prevent this by placing charcoal powder on the surface, but have been unsuccessful.

We would greatly appreciate having whatever comments any members of the Wire Association may make."

✦ ✦ ✦

Question No. 1202

"Can you find out whether any mill has been making an aluminum bronze mixture in rod or wire rod that would cover an analysis within the range below:

Copper 91% to 98½%
Aluminum ½% to 4%
Tin 1% to 5%

Exports and Imports of Wire

Exports of iron and steel wire products in Jan., 1932 and Feb., 1932
(In gross tons)

	February 1932	January 1932	February 1931
Wire rods	2,468	1,108	3,363
Hoops, bands and strip steel	2,340	1,863	3,797
Plain Black or galvanized iron or steel wire	1,045	698	1,162
Barbed wire and woven wire fencing	1,189	1,478	2,179
Woven wire screen cloth	44	42	99
Wire rope	191	155	276
Insulated iron or steel wire and cable	8	12	33
Other wire and manufactures	223	187	471
	476	1,202	561
Tacks	36	32	35
Other nails including staples	223	266	256
Bolts, machine screws, nuts, rivets and washers	263	225	434
Total, these 12 classifications	8,506	7,268	12,666

Imports of iron and steel wire and wire products into the United States
(In gross tons)

Concrete reinforcement and other bars	5,411	7,298	6,609
Wire rods	843	986	1,038
Barbed wire	1,400	1,325	403
Round iron and steel wire	232	147	389
Telephone and telegraph wire		2	2
Flat wire and strip steel	68	71	63
Wire rope and strand	129	139	89
Other wire	73	84	73
Hoops and bands	1,896	2,034	1,248
Nails, tacks and staples	797	800	625
Bolts, nuts and rivets	19	18	92
Total, these 11 classifications	10,868	12,904	10,631

THE United States foreign trade in wire for electrical purposes showed a considerable decrease in exports for January 1932 as compared with January 1931. The figures are given below.

	January		Last six months	
	1931	1932	1930	1931
Insulated iron or steel wire and cable	$ 21,997	$ 5,978	$ 74,795	$ 42,528
Copper, bare wire	129,602	48,743	896,449	211,414
Insulated copper wire and cable:				
Rubber-covered wire	61,955	46,044	379,752	202,657
Weatherproof wire	21,862	24,304	179,890	114,478
Telephone cable	25,832	12,304	90,601	47,274
Other insulated copper wire	214,830	73,104	1,340,787	536,532
Nickel-Chrome electric resistance wire	16,458	19,659		168,202

BOTH the export and the import trade of the United States in iron and steel products were in smaller volume in February than in January. The decline in exports was relatively small, and the trade of the month was characterized by increased shipments to North and Central America and the West Indies, Europe, and the Far East; by gains in the trade with the month's five leading markets; and by increases in approximately three-fifths of the individual classes of material included in the total. The drop in imports was more marked—approximately 15 per cent.

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THE decline in exports in February amounted to only 168 tons. Included in the products in which the export tonnage increased were wire rods 1,360 tons and scrap 1,311 tons.

THE export trade with each of the month's five leading markets was greater than it had been in January—shipments to Canada increasing by 2,097 tons, those to Japan by 1,650 tons, those to the Philippine Islands by 1652 tons, those to Brazil by 339 tons, and those to the United Kingdom by 1,075 tons. The trade with Canada was featured by shipments of 1,307 tons of hoops, and 1,160 tons of scrap . Scrap (7,142 tons) was also the leading item in the trade with Japan, followed by 1,528 tons of wire rods. The shipment of 665 tons of steel bars featured the trade with the United Kingdom.

✦ ✦ ✦

THE leading supplier of iron and steel products was Belgium. Its total of 7,500 tons—3,197 tons less than in January—included 1,910 tons of concrete reinforcement bars and 1,731 tons of merchant steel bars. Germany was second with a total of 6,189 tons, in which were included 1,032 tons of hoops, and 1,000 tons of merchant steel bars. The trade with the Netherlands (5,253 tons) was marked by 758 tons of barbed wire.

✦ ✦ ✦

IMPORTS of card clothing were more than doubled in February, totaling 5,792 square feet ($6,434) and including 3,654 square feet ($3,064) received from the United Kingdom, 2,099 square feet ($3,241) from Germany, and 39 square feet ($129) from Switzerland.

✦ ✦ ✦

WIRE cloth and screening receipts were smaller, the 15,780 square feet total including 8,710 square feet imported from Canada, 5,571 square feet from France, 1,199 square feet from Sweden, and 300 square feet from Belgium.

✦ ✦ ✦

FOURDRINIER wire imports rose to 107,862 square feet from 90,159 square feet, and included 71,041 square feet brought in from Germany, 28,400 square feet from Austria, 5,874 square feet from France, and smaller quantities from Czechoslovakia, Sweden, and Belgium.

✦ ✦ ✦

WIRE fencing and netting imports were must larger in February—that galvanized before weaving totaling 7,468,271 square feet (4,385,301 square feet from the Netherlands, 2,228,890 square feet from Germany, and 854,080 square feet from Belgium), and that galvanized after weaving 7,394,315 square feet (4,338,925 square feet from Germany, 2,134,640 square feet from the Netherlands, and 920,750 square feet from Belgium.

✦ ✦ ✦

IMPORTS of wire heddles were greater by three times as compared with those in January—the 3,350,000 piece total including 2,218,000 pieces from Switzerland, 311,000 pieces from Belgium, and the rest—218,000 pieces—from France.

Electrical Characteristics of Rubber Insulation

(*Continued from page 147*)

cable constants, such as, capacitance, leakage, and power factor.

✦ ✦ ✦

MUCH research work has been done in the development of suitable submarine telephone rubber compounds. Figure 11 shows the capacitance of wire insulated with five different types of compounds immersed in fresh water at room temperature for three years. Compound A had 30 per cent rubber content and was not designed for submarine use. It failed after twenty-one months in water. Compounds B and C both had 40 per cent rubber content but Compound B was not designed for underwater service. Compounds D and E are suitable for submarine service. Their capacitance is low and the rate of change with immersion is small.

✦ ✦ ✦

FIGURE 12 shows the relation of 60-cycle power factor characteristics of the same compounds to time of immersion.

The power factor of compound A increases very rapidly until cable failure. The high original power factor of this compound indicates that it is not suitable for high voltage operation since such a high power factor means high dielectric loss. The obvious conclusion to be drawn from the capacitance and power factor curves is that compound A would be suitable only for low voltage work under dry conditions.

✦ ✦ ✦

THE high values of the power factor of compounds B and C and their rapid increase with time of immersion indicate that although superior to compound A, they are not satisfactory for submarine work. While compound D has a low initial power factor the increase after three years indicates that it is inferior to E, which shows no increase with time of immersion.

✦ ✦ ✦

THE 1000-cycle curves show the same general trend as given in Figs. 11 and 12. The D. C. insulation resistance decreases rapidly with time in water on compounds which have poor water absorption characteristics while it remains high in compounds of the type of D and E.

✦ ✦ ✦

IN general from the above it seems that the most reliable indication of the suitability of a compound for use in water may be obtained from the capacitance and power factor tests against time in water. Since it is obviously impractical to wait several years to determine the water absorption characteristics of a compound, a careful study of curves of the above type has been made to see if the suitability of a compound for service may be predicted within a week or two after immersion. Such study has resulted in accelerated water absorption tests being included in the latest specifications for submarine telephone cable. A typical accelerated test of this type, as required by the U. S. Coast Guard for submarine telephone cable is given below:

1. Water Absorption
   Increase in grams per square inch of exposed surface after 7 days in water at 70° C. ..... 0.03 Maximum

	Time in Water at Room Temperature	Maximum Per Cent Increase
2. Change of Electrical Properties		
Dielectric Constant at 1000 Cycles	10 days	5.0
	20 days	7.5
Power Factor at 1000 Cycles	10 days	0.0
	20 days	5.0

It is required that the water absorption tests be carried out on the insulated wire. The changes of electrical properties are determined on 40 to 50-mil rubber sheets in a specially constructed apparatus in which both sides of the sample are exposed to water.

"NEP"

New Economic Principal

✦ ✦ ✦

The only Soluble Inhibitor in Powdered Form on the Market

"NEPOWDER"

We know what the Wire Industry needs to properly Gleau Metal and that is

"NEPOWDER"

✦ ✦ ✦

One pound controls 300# of Acid

✦ ✦ ✦

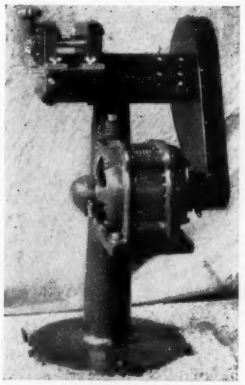
There is no other Inhibitor on the Market produces such a bright finish in Gleaning Rods and Wire.

THE Wm. M. Parkin Company

Chemical Engineers to the Steel Industry 20 Years.

PITTSBURGH, PA.

RUESCH



Roll Strip Straightening Machine
For Thermostatic Metal, Brass and Steel
Wire, Tube and Brass Mill Machinery

H. J. RUESCH MACHINE CO.
409 Mulberry St., Newark, N. J.

A Review of Recent Wire Patents

No. 1,847,454, WIRE STRAIGHTENER, Patented March 1, 1932, by Hartwell W. Webb, of Flint, Michigan, Assignor to A. C. Spark Plug Company, of Flint, Michigan, a Company of Michigan.

The wire straightener of this invention is stated to be particularly adapted for use on the winding machine for wire cables, disclosed application bearing Serial No. 288,990, filed June 28, 1928. All the dies of the straightener are adjustable at one time so that they may properly assume their relative interrelation to perform their functions.

✦ ✦ ✦

No. 1,847,455, REELING MECHANISM, Patented March 1, 1932, by Hartwell W. Webb, of Flint, Michigan, Assignor to A. C. Spark Plug Company, of Flint, Michigan, a Company of Michigan.

This device is adapted for connection to the winding machine disclosed in application for patent Serial No. 288,990, filed June 28, 1928 for winding up the flexible cable from a flexible cable winding machine.

✦ ✦ ✦

No. 1,847,567, ROLL FOR WIRE DRAWING MACHINES, Patented March 1, 1932, by Leo Lorenz, of Muskegon, Michigan, Assignor to Anaconda Wire & Cable Company, of New York, N. Y., a Corporation of Delaware.

Included in this assembly is a plurality of rings whose diameters vary by predetermined increments and these rings are mounted on supporting members which are adapted to be rotated by any suitable means. The rings are removable and any one may be removed and a new one substituted without changing the draft of the machine as a whole.

✦ ✦ ✦

No. 1,847,771, TRIANGULAR MESH WIRE FABRIC, Patented March 1, 1932, by Arthur A. G. Land, of Chicago, Illinois.

The strands of this wire fabric are formed so that three of the four bights at which each mesh is interlocked with other meshes align longitudinally of the fabric with the intermediate one of the three bights aligns transversely of the fabric with the fourth bight, and so that two of the customary four side portions of the usual chain-link wire mesh extend approximately in continuation of each other.

✦ ✦ ✦

No. 1,847,378, SPRING WIRE CONNECTOR. Patented March 1, 1932, by Roger M. Browning of Worcester, Massachusetts, Assignor to Edward C. Bowers and Charles L. Feldman, Receivers for Wickwire Spencer Steel Company, of New York, N. Y., a Corporation of Massachusetts.

This inventor provides a spring wire coil for connecting together the ends of a coil spring.

✦ ✦ ✦

No. 1,848,744, WIRE DISPENSER, Patented March 8, 1932, by Joseph Pavlas, of Chicago, Illinois.

Complete Descriptions and Drawings of Patents May Be Had for 25 cents. Address, Wire & Wire Products, 551 Fifth Avenue, New York.

A number of different sized wires may be dispensed from this reel, the device being arranged so that the several wires will not become entangled. Particularly, the reel is intended for use by electricians and others.

✦ ✦ ✦

No. 1,848,771 HAIRPIN, Patented March 8, 1932, by Edward D. Davis, of Chicago, Illinois, Assignor to the Roye Needle Company, of Chicago, Illinois, a Corporation of Illinois.

This pin is made of a single strand of wire, flattened, except for its intermediate portion, the flattened portions being knurled and one of the legs waved.

✦ ✦ ✦

No. 1,849,193, SUBMARINE CABLE, Patented March 15, 1932, by Ralph G. McCurdy, of Englewood, New Jersey, Assignor to American Telephone and Telegraph Company, a Corporation of New York.

Particularly, the invention covers means for additional shielding and protection at the shore end of cables, the inventor making use of the discovery that the shielding effect of a homogeneous pipe covering is much greater than that of tape armouring of similar material and equal weight per unit of length.

✦ ✦ ✦

No. 1,849,410, FENCING, Patented March 15, 1932, by Rolf Selquist, of McKeesport, Pennsylvania, Assignor to Copperweld Steel Company, of Glassport, Pennsylvania, a Corporation of Pennsylvania.

Electrolysis between the wire fencing and its supports is eliminated by this invention. The inventor provides a wire tie, of copper-covered steel wire having a heavy lead-tin coating, and this tie carries the fencing supported by the posts or other supports but with the fencing and supports spaced apart.

✦ ✦ ✦

No. 1,849,705, SPRING COILING METHOD AND MEANS, Patented March 15, 1932, by Gorman C. Burd, of Newark, New Jersey, Assignor to American Cable Company, Inc., of New York, N. Y., a Corporation of Delaware.

So that the springs will issue from the coiler without rotation, the inventor provides a mandrel on which the wire is carried about, thereby wrapping the wire about the mandrel, means being provided for pressing the wire tightly against the mandrel.

✦ ✦ ✦

No. 1,850,077, WIRE SEALING FASTENING MACHINE, Patented March 22, 1932, by Cephas D. Hatfield, of Denver, Colorado.

This device is adapted to twist the ends of wires used in looping about pails, etc.

No. 1,850,102, WINDING MACHINE, Patented March 22, 1932, by Martin B. Grout, of Chicago, Illinois, Assignor to Kellogg Switchboard and Supply Company, of Chicago, Illinois, a Corporation of Illinois.

Adapted to wind the wire or foil used in condensers this device will permit the proper number of turns of wire to wound and will then automatically stop the winding spindle, so that the terminals may be affixed.

✦ ✦ ✦

No. 1,850,181, MAGNET CORE, Patented, March 22, 1932, by Philip Norton Roseby, of Liverpool, England, Assignor to Automatic Telephone Manufacturing Company, Limited, of Liverpool, England, a British Company.

This is a core for loading coils and the like and consists of particles comprising short lengths of nickel-iron wire which are insulated from one another by a coating of nickel and iron phosphotes and consolidated by pressure.

✦ ✦ ✦

No. 1,850,666, MACHINE FOR MAKING WIRE CLIPS, Patented March 22, 1932, by Harry E. Frenette, of Duluth, Minnesota.

This machine is especially adapted for making post attaching clips having a twisted end portion, and will twist and form such clips without the necessity of transferring the clip from one set of dies to another.

✦ ✦ ✦

No. 1,851,540, MACHINE FOR MAKING SPIRAL SPRINGS, Patented March 29, 1932, by John F. Gail, of Evanston, Illinois, Assignor to Simmons Company, of New York, N. Y., a Corporation of Delaware.

This is described as an improvement upon the inventor's machine, disclosed in U. S. Patent No. 1,681,728, dated August 21, 1928, and in this machine the various operations are performed progressively on each spring.

✦ ✦ ✦

No. 1,851,677, STAPLING MECHANISM, Patented March 29, 1932, by Isaac W. Litchfield, of Boston, Massachusetts, Assignor to Bemis Bro. Bag Co., of New York, N. Y., a Corporation of Missouri.

Adjustable to take care of various lengths, the mechanism provides for the forming of the staple from wire, and advanced to position for insertion by parts having a relatively short working stroke, so that the device will operate with speed.

✦ ✦ ✦

No. 1,851,785, COIL WINDING AND CUTTING MACHINE, Patented March 28, 1932, by John Taylor, of Kansas City, Missouri.

A winding and cut-off machine is provided having a reciprocating forming block which is moved to sever the material as it is continuously fed into the machine.

'Round the World With the Wire Industry

German Notes

THE German Bureau of Standards (DIN) has now classified the production of corrosion resisting steel wires, mainly copper bearing steel. These steel wires, which are used more and more in mining, agriculture and for cable production are classified according to their tensile strength, elongation, streathing limit and corrosion resistance in sea water and rich acid atmosphere.

✦ ✦ ✦

THE production of wires and wire products in Germany has been estimated for the year 1931 at 591,000 tons which would be a decrease compared with 1930 by 17%. This is comparatively little, as the production of all other finished iron and steel products declined far sea vier., sheets for example by 38%, hoops by 31%, bars and joists 36%.

✦ ✦ ✦

THE IWECO has not yet been able to exercise any influence upon the International trade in wire netting. Sellers are still quoting a rebate of 89½% off the British standard list, a price which is far below the quotation of the IWECO and it is probable, that the wire netting section of the cartel will collapse, after having been in action only four weeks.

✦ ✦ ✦

International Tube Cartel

THE International Tube Cartel, which expires March 31, has been renewed until 1935 without significant change. The British continue to adhere to the plan. The cartel has arrived at no special decision with respect to prices.

✦ ✦ ✦

Venezuelan Tack Trade

GERMAN manufacturers are reported to be supplying the greater part of the *Venezuelan* demand for tacks. No exact statistics descriptive of this trade are available, but as it is estimated that Germany is able to supply at least twice the quantity sent Venezuela by the United States some idea of the volume of business done by this competitor can be arrived at from the figures of United States exports of tacks to Venezuela in 1930, a trade which amounted to 36,331 pounds, to a total value of $4,818. The German predomination in this trade is said to be primarily due to low prices which as of January 20, 1932, were $9.85 c. i. f. La Guaira per keg of 46 kilos of 10 mm. tacks; $7.05 for ½ inch tacks; $6.50 for ⅝ inch tacks; and $4.25 for ¾ inch tacks.

✦ ✦ ✦

Difficulties of French Bolt Manufacturers

THE increasing severity of the unfavorable business situation is causing more and more concern to the bolt manufacturers in *France*. This aggravated situation is due mainly to two factors, first, to the attitude of indecision of prospective purchasers who are unwilling to buy in substantial quantities (despite the realization that they now require or will very soon require additional supplies of bolts) hoping that the disorganized competition among bolt manufacturers will cause prices to fall to an even lower level, and, second, to the policy of the railway companies which have almost entirely ceased purchasing.

French bolt manufacturers have been urged to follow the example of the German Syndicate which by cooperative effort is said to have brought about an improvement in the position of the German bolt industry, and to appeal to the Government to enable the railway companies to renew their orders.

✦ ✦ ✦

French Duties On Strip Steel

IN the recent French decree of March 16th, published in the French Journal Officiel for 1932, it was announced that import quotas have been placed on the importation into France of strip, (hoop) steel, for the period from March 1st to June 30th, 1932.

✦ ✦ ✦

Uruguay Tax On Wire In Rolls

THE government of Uruguay has reduced ground taxes (storage charges) for black wire in rolls. The new ground taxes for these commodities are as follows:

The above goods may be withdrawn from customs premises within 30 days after unloading from the ship, without being subject to ground tax. If they remain on customs premises longer than 30 days, they will be taxed 1 peso per cubic meter or per 1,000 kilos, at the option of the customs authorities, for the net 30 days or fraction thereof. The third 30-day period will be charged 2 pesos per cubic meter of 1,000 kilos, and this rate will become 2.50 pesos for the next 30-day period, and will remain unchanged for succeeding periods.

✦ ✦ ✦

THE Canadian Minister of National Revenue has announced that minimum valuations for import duty purposes had been established on thumb tacks, drawing pins, and furniture, chair and upholstery nails.

✦ ✦ ✦

IN the revised list of articles exempted from the general 10 per cent ad valorem duty imposed under the above Act of 1932 by the United Kingdom and Ireland, the following additions have been made to the free list:

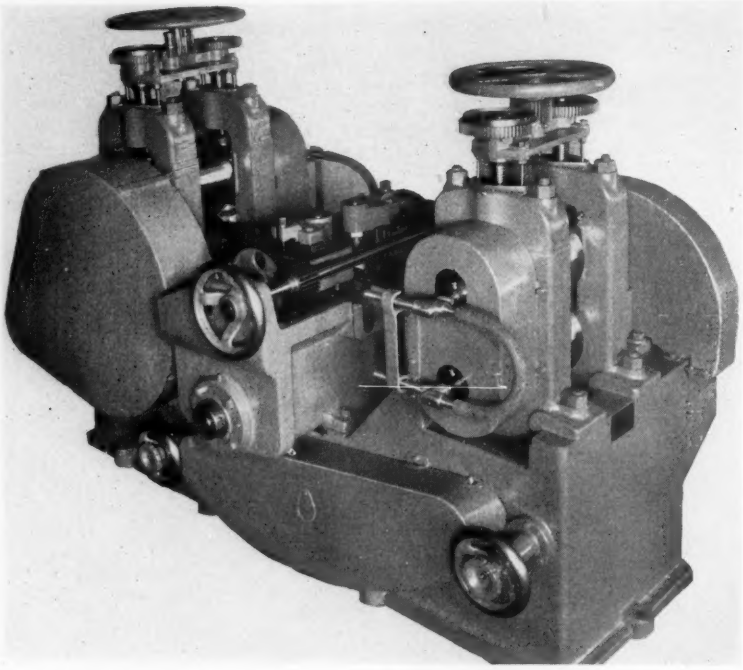
Platinum in grain, ingot, bar or powder.

Copper unwrought, whether refined or not, in ingots, bars, blocks, slabs, cakes and rods.

✦ ✦ ✦

EXECUTIVE decree No. 1248 published by the government of Guatemala doubled the import duties on steel mattresses, on mattresses made of steel wire fabric and spring mattresses of steel wire.

Flat Wire Rolling Mill



10" Breakdown—5" Edging—8" Finishing Rolls Driven by 40/50 h. p. 3 to 1 Variable Speed Motor. Capacity 150 to 450 ft. per minute. Wire Straightening rolls, scarfing attachment, guides between rolls and Take-up stand to suit customer's needs.

WE BUILD

Chain Draw Benches—Multiple Coil Winders.

Flat Wire Rolling Mills—Rod Pointers.

Hollow Wire Straighteners and Equipment.

Multiple Strand Bright Annealing Units.

Stranders to Customers' Specifications.

Reelers and Spoolers for all sizes of Wire and Cable.

Reelers and Spoolers for Tinning, Galvanizing, Patenting and Annealing.

Frederick M. Conran

Designer and Builder of Special Machinery

107 Colden Street Newark, N. J.

Wire Association Program

(*Continued from page 153*)

"Preferred" list in the War Department. In the near future, Mr. Granger further stated, complete questionnaires would be sent out by the Wire Association to the entire wire industry in connection with Army and Navy wire requirements and any firm desiring information on this subject at this time should address the Secretary of the Wire Association.

✦ ✦ ✦

Directors Terms

IT was unanimously voted to confirm the change of meeting place and date of the annual Meeting and Exhibit to that of October, 1932 in conjunction with that of the National Metals Congress, at Buffalo, N. Y., as arranged for by the Secretary.

Because of this change it becomes necessary to hold over the present Board of Directors until the October meeting and it was unanimously voted that they so do.

It developed in the discussion, that under the present By-laws of the association, the terms of all present Directors expired simultaneously;—Since this does not operate to the best advantage of the Association, it is proposed to amend the By-laws so that the terms of Directors shall be on a "stagger" system—and a notice to this effect is being mailed to all members.

✦ ✦ ✦

Membership Liability

THE question of "liability" of members of the Association and firms contributing to its support was brought up and certain changes were recommended to be made in the phraseology of the By-laws which would eliminate all liability of any kind to both members and contributors. A notice of such changes will be mailed to members of the Association, and it is requested that they send in their approval by return mail upon receipt of such notice as such changes become effective only upon the affirmative vote of two-thirds of the members of the Association.

Sharon Steel Hoop Operating New Strip Mill

SHARON Steel Hoop Company has started regular operation of its new four-high strip finishing mill, built by the United Engineering & Foundry Company, Pittsburgh. The new unit is capable of rolling strips up to 20 inches in width. It is an extension of the present continuous hot strip mill and replaces the former two high finishing stands.

The Second Article on Fourdrinier Wire Will Appear in the June Issue.

Statement of ownership, management, circulation, etc., required by the Act of Congress of August 24, 1912, of Wire & Wire Products published monthly at Washington, N. J., for April 1, 1932.

State of New York, County of New York, ss.: Before me, a Notary Public in and for the State and county aforesaid, personally appeared Richard E. Brown, who, having been duly sworn according to law, deposes and says that he is the Business Manager of Wire & Wire Products and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher, Quinn-Brown Publishing Corporation, 551 Fifth Avenue, N. Y. City; editor, Richard E. Brown, N. Y. City; managing editor, none; business manager, Richard E. Brown, 551 Fifth Avenue, N. Y. City.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.) Quinn-Brown Publishing Corporation, 551 Fifth Avenue, New York City, Geo. I. Baker, Hammonton, N. J., and Leta B. Brown, of 551 Fifth Avenue, New York City.

3. That the known bondholders, mortgagees, and other security holders owning or holding one per cent of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

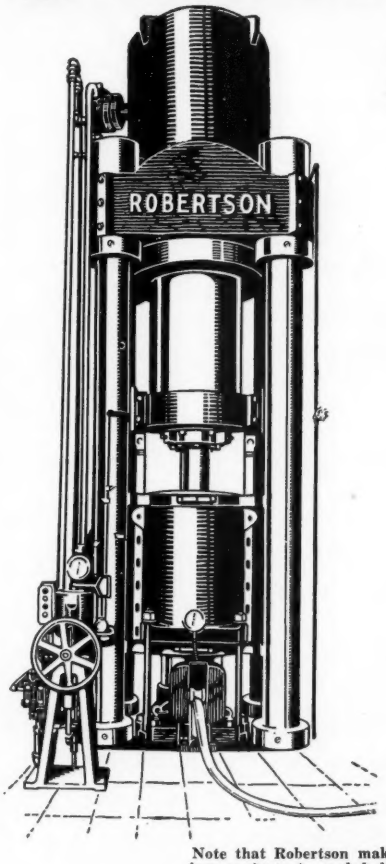
RICHARD E. BROWN,
(Business Manager)

Sworn to and subscribed before me this 14th day of March, 1932.

(SEAL) L. D. SCHWAERER,
Notary Public.

My commission expires March 30, 1932.

Outside Forces



Drove them ahead!

An inner urge caused the Vikings to put to sea—but outside forces of tide and wind drove them ahead.

An inventive spirit caused John Robertson to make the first lead-encasing die-block forty-seven years ago—and the outside forces of industrial progress, the expansion of the wire and cable industry, have been driving Robertson lead presses onward and ahead ever since . . . .

Robertson lead-encasing presses for wire, cable, rods, and rubber hose are giving SATISFACTORY PERFORMANCE here and abroad. Close contact with the users of this equipment enables Robertson to give INTELLIGENT SERVICE at all times. This cooperation of user and builder is a continuous contribution to the Lead Cable Industry.

Note that Robertson makes all types of Lead Encasing equipment needed by the wire and cable industries: Extrusion presses, hydraulic pumps, melting furnaces and pots, dies and cores, strippers, etc. We also make the Robertson hydro-pneumatic Accumulator. WRITE FOR VARIOUS ROBERTSON BULLETINS.

John ROBERTSON CO. INC. *Pioneers~Since 1858*

125-137 Water Street Brooklyn, N. Y

Metal Spools for Wire Drawing

Metal Spools for Annealing

Metal Bound Spools for Shipping

Metal Bound Reels for Shipping

Hubbard Spool Co.

1620-32 Carroll Avenue

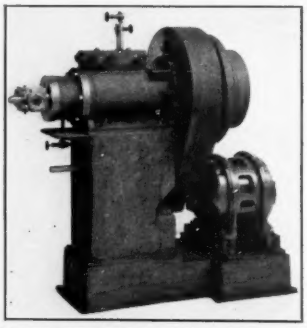
Chicago

Also Sales Representative

STEEL REEL AND SPOOL DIVISION

American Pulley Co. Philadelphia

JOHNSON SUPER PRODUCTION TUBING & STRAINING MACHINE



WILL REDUCE YOUR RUBBER INSULATING COSTS

Its present production speed is only limited by panning or reeling efficiency.

It has no peer for wire covering or tubing speed.

Burning of compound is reduced, not increased.

Overcome competition dependent on present slow methods, by adopting this machine.

CORONE WIRE INSULATORS, INC.

Sole Distributors under the Johnson Patents.

Putnam, Conn. U. S. A.

Pin and Needle Manufacture

(*Continued from page 157*)

them to dry and polish them. Lastly the pins are set into papers of 10 to 25 pins each. For this job the paper is folded in a long peculiar fold and the folded edge punctured with a metal comb. The pins are put into these holes and when the paper is unfolded they are found to be exactly in place and ready for the market.

Sewing Needles

SEWING needles are made of fine iron wire, the method being the same as described for pins except that instead of heads they have eyes drilled or punched. To stand punching the iron has to be soft, the eyes are elliptical, and on account of the softness these needles are inferior to those with round drilled eyes, but as the punching takes only a blow the punched needles are cheaper.

(*Please turn to page 170*)

Wire Galvanizing Process

(*Continued from page 151*)

cal, and, I venture to claim, with success.

✦ ✦ ✦

I CAN assure Mr. Rylands that the technical difficulties he suggests in spectrum-analysis do not arise, and that this method of examination gives valuable and accurate information as to the metals present in various types of galvanised coatings. With regard to the spectrograms, it would obviously be of advantage to my case to be able to publish these, but there are certain technical difficulties in reproducing these except on art paper. Personally, I regard spectrum-analysis as the most definite means of testing galvanised wire used in the higher grades, where the purity of the coating is important, both in lasting qualities and in standing up to severe bending.

✦ ✦ ✦

I HAVE tried to be fair to the Crapo process, which I have stated and shown in my diagrams to be the best of the hot-galvanising processes I have so far examined; I am sorry Mr. Rylands is unable to adopt a similar attitude in respect to electro-galvanising. As to his reference to the article on electro-galvanising in the *Iron and Coal Trades Review* of July 18, 1930, I see no reason to amend any of our process.

✦ ✦ ✦

The Preece Test

WITH regard to the Preece test, Mr. Rylands agrees with me that pure zinc is more rapidly attacked by copper-sulphate than impure zinc. As confirming this point, and throwing further light on what this difference in the rate of attack means, the following is rather an interesting extract from *Protective Metallic Coatings*, by Mr. H. S. Rawdon, Chief of the Metallurgy Division of the Bureau of Standards, Washington, U. S. A.:—

Through a lack of appreciation of the principle upon which this test is based, and particularly as a result of the endeavour to

use it in the comparison of zinc coatings differing very materially in composition and structure and hence in their reaction to the copper-sulphate solution, the test has met with disfavour with many. It is a matter of rather common experience in the testing of zinc coatings that the results obtained with the copper-sulphate test vary according to type of zinc coating tested. A coating with a high alloy content will withstand several more one-minute immersions in a copper-sulphate solution than a pure zinc coating of the same thickness. This is demonstrated very strikingly by the following results by Peirce which show that the rate at which the alloy layer in a zinc coating dissolves in a copper-sulphate solution such as is used for the Preece test is approximately only two-thirds that of zinc in the same solution.

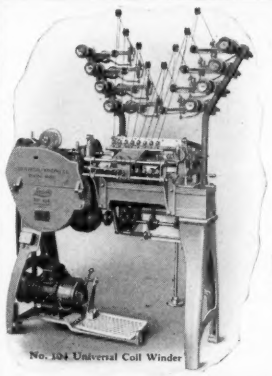
So long as the copper-sulphate test is restricted to the comparison of materials which have been coated in the same manner, very useful information on the relative thickness of such coatings and the variations in the thickness in the coating of individual specimens can be obtained. It should not be claimed, however, that since zinc coatings of a high alloy content show a greater resistance to the corrosive action of a copper-sulphate solution than do coatings of pure zinc, they will also resist atmospheric corrosion better. An atmospheric corrosive attack is the result of the combined effects of a number of factors, both of corrosion and erosion.

✦ ✦ ✦

---and Why is it Retailed?

A METHOD of testing which will remove these differences seems difficult to devise, and probably the Preece test, owing to its convenience, is best retained, providing the samples are dipped after bending or wrapping, instead of in the straight length as is the case under the present specification. Where the quality of the coating has to be of the highest grade, then examination by spectrum-analysis is a valuable check test.

MACHINES
FOR COATING WIRE
with
RUBBER, PLASTIC or FLUX
▲ ▲ ▲
Your Inquiries Solicited
JOHN ROYLE & SONS
Straight & Essex Sts., Paterson, N. J.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An interesting development for more efficiently producing paper-insulated coils. Paper is injected automatically without attention from the operator. Fully adjustable for a wide range of coil and wire sizes.

Six other machine types complete a line of coil winders answering any possible manufacturing need.

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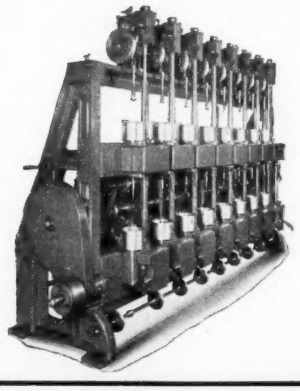

WHY PAY MORE?

When wire can be insulated at a lower cost on the AIMCO line of insulating machinery than on any other machines, the initial investment being less with consequent lower depreciation and maintenance charges, and the labor cost per pound of finished wire running remarkably low.

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"American" INSULATING MACHINERY COMPANY
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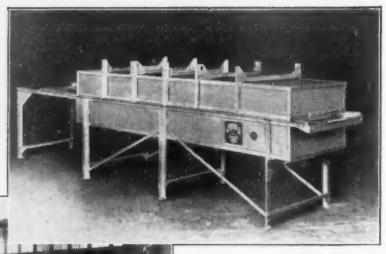

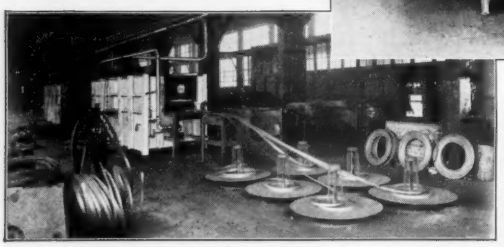

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Complete heating equipment for strand annealing, billet heating and intermediate operations.

Bright annealing furnaces for ferrous and non-ferrous metals.

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"Furnaces to Suit Conditions"

Electricity---Gas---Oil---Coal

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Industrial Heating Equipment
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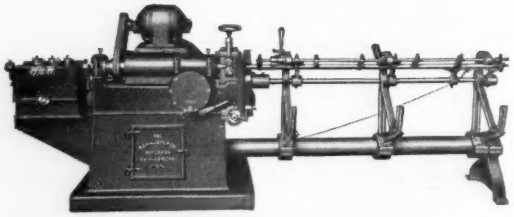
when you use
SHUSTER MACHINES
for your
WIRE STRAIGHTENING AND CUTTING



Their rugged construction insures long life under the hardest kind of service.

Steel Fliers, Timken Roller Bearings and other patented features.

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Straightener Specialists Since 1866

UNDER these circumstances, I still consider that the specification I suggested, which covers both the ordinary and the highest grades of galvanising, is a fairer and more reliable means of determining the true value of a galvanised coating than is possible under the present specification. It is not correct to suggest the amendments I have submitted are merely put forward to suit electro-galvanising, but it is generally recognised that the present specification is not a reliable or satisfactory one, and, to some extent, Mr. Rylands agrees that this is so.

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Editorial Comment

IN this issue is concluded the controversy which has been going on between Mr. L. D. Whitehead, and Mr. Geoffrey K. Rylands. When we invited Mr. Whitehead, at the beginning of the year, to contribute an article on the electro-galvanising method we had no idea that it would lead to a controversy which was to attract the attention of wire drawers, galvanisers, and users abroad as well as at home. However, what was begun as a news article has developed into a first-rate technical controversy, and none will question the standing of the two contestants, or their right to engage in it. Happily, we are not called upon to decide upon the relative claims of the two processes, and perhaps the best that has come out of the controversy, and the correspondence over it has been the proofs that the wire-drawing industry is abreast of modern ideas, and has probably never been technologically in a better position that it is at the present time, no matter which of the processes is favoured by consumers. If the matter could have been arranged before the event, it is just possible that the controversy might have taken somewhat different lines; it just developed, and for that reason it became centered in productions of two different works using two special methods. Mr. Geoffrey Rylands conducted his experiments at his company's laboratory, but Mr. Whitehead, although he had similar facilities, took steps to en-

sure that the investigations should be of an entirely independent and impartial nature. To that end the choice of the investigator was left in the hands of a fully qualified consultant on the subject, and he arranged that the tests were carried out at the Birmingham University, and no communication passed until the findings were reached. The controversy has, therefore, been conducted on lines other than might have been the case had its course been foreseen, and the relative claims examined in an entirely independent laboratory. It may be argued that the result is not strictly impartial, but the controversy has been carried on in such good temper that the outcome cannot be other than illuminating and helpful to the industry as a whole. We have reason to believe that some readers thought that the discussion has been of a too restricted character in view of the important issues raised, but both Mr. Whitehead and Mr. Rylands are keenly interested in production of first-rate materials, and the processes practised by them at their respective works are up to date, and we cannot but feel they have co-operated in a friendly way and conducted the controversy in the best interests of a great industry.

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Methods of Heating and Cooling Wire

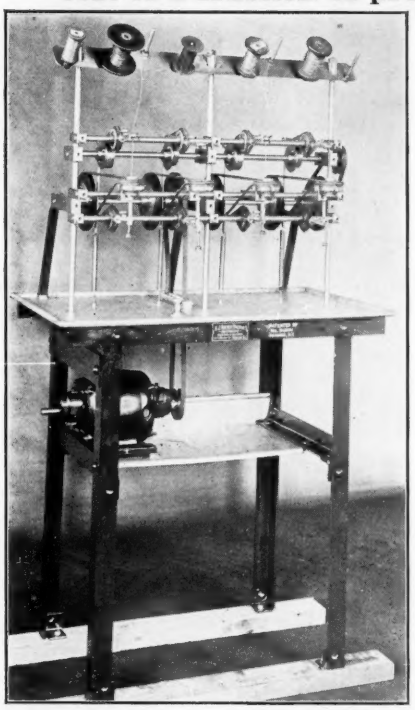
(*Continued from page 144*)

the individual strand, or an equivalent that will maintain the principle of uniform exposure without unwinding the coil. This point is illustrated by the difference in practice in meeting exacting requirements for hardening high carbon wire in strand form, and the prevalent practice of annealing low carbon stock in the form of a large mass of tightly wound coils either in an open chamber or within a pot.

✦ ✦ ✦

The second part of this article, describing various types of furnaces with particular reference to strand heating furnaces, coil heating furnaces, annealing, influence of furnace design, etc. will appear in the June issue of WIRE & WIRE PRODUCTS.

The Haddow Die Re-Cutting and Polishing Machine will lower your die re-cutting cost to a fraction of present costs



Why do you continue to pay a die cutter and pay for diamond dust to remove a large percentage of your diamond from your dies? Diamond that has done no work—when, by the use of the Haddow Die Recutting Machine you may use practically all your diamonds to draw wire, especially in the small sizes.

ONE MONTH'S SHOP PRODUCTION

Total number of dies cut —1047

Total number of hours required—182.5

Average number of dies per hour—5.73

Number of operators—1

With only one man—This machine will do the work now requiring four to six men in less time and at lower cost.

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Wire Drawing Soap Powder
Made from high titre Palm Oil stock for high carbon drawing.
Proven by test to lower costs and improve efficiency.
Manufactured exclusively for wire drawing by

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Pin Manufacturing

(*Continued from page 166*)

Round wire can be neither drilled nor punched, so the blanks must be flattened a little at the blunt end and a little depression sunk into them to facilitate the drilling or punching. For this job there is a tool consisting of two parts hinged together like the covers of a book. Each part has a small groove of the proper shape and size according to the size of the needle, and they must exactly register. In the lower groove at one end is a sharp projection which forms the groove in the needle in its under side. On the top member there is a slot through which a small chisel point can be driven by a sharp light blow, to form the other groove.

IF the needles are to be punched this is done by a light blow with a hammer and punch. If they are to be drilled, the driller holds the needle with pliers under a sharp drill which he works with a bow and cord, and a couple of strokes does the job. Iron is too easily bent to make good sewing needles, and must be hardened, or converted into steel. I don't know just how that is done, but believe it could be done by the cementing process used for making iron into steel for other purposes. After cementing they must be tumbled in a keg with chalk to polish them, after which they go back to the pointer and have their points sharpened up again."

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Rod Frames—16" Frames, 8" Frames —Take-Up Frames, Wire Pointers— Puller Tongs.

General Castings for Wire Mill use.

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WANTED: Job lots basic wire, all sizes. Give description and lowest price. Address Box 800, Wire & Wire Products, 551 5th Ave., New York, N. Y.

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Practical engineering advice from rod mill to finished product.
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See Furnaces—Various Headings

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Vaughn Machinery Co., Cuyahoga Falls, O.

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Corone Wire Insulators, Inc., Putnam, Conn.

CRANES—Wire Mill
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Waterbury Wire Die Co., Waterbury, Ct.

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1932
Meeting
and Exhibition
Will be held at
Buffalo, New York
During the week of
October 3, 1932
In association
with the
Annual
National
Metal
Congress

DIES—Composition
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Vianney Wire Die Works, New York, N. Y.

DIES—Diamond
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Vianney Wire Die Wks., N. Y.

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Union Wire Die Corp., N. Y.
Vianney Wire Die Works, New York, N. Y.

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Diamond Die Co. of America, New York, N. Y.
Vianney Wire Die Works, New York, N. Y.

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John Robertson Co., Brooklyn, N. Y.

PRESSES—Lead Encasing
John Robertson Co., Brooklyn, N. Y.

PRESSES—Lead Extrusion
John Robertson Co., Brooklyn, N. Y.

PULLERS—Wire
E. J. Scudder Fdry. & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.

PUMPS—Hydraulic
John Robertson Co., Brooklyn, N. Y.

REELS AND SPOOLS—All Kinds
R. B. Hayward Co., Chicago, Ill.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.

REEL AND TENSION STAND—
Sleeper & Hartley Inc., Worcester, Mass.

REEL CRUTCHES
R. B. Hayward Co., Chicago, Ill.
Watson Machine Co., Paterson, N. J.

ROLLING MILLS—See Machinery—Rolling Mill

SOAPS—Wire Drawing
R. H. Miller Co., Homer, N. Y.
J. T. Robertson Co., Syracuse, N. Y.

STEEL PLATE CONSTRUCTION—
National Wrought Iron Annealing Box Co., Washington, Pa.

TANKS—Compound
Watson Machine Co., Paterson, N. J.

TANKS—Steel Plate
National Wrought Iron Annealing Box Co., Washington, Pa.

TRUCKS
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

TUBE BENDERS AND FORMERS
H. J. Ruesch Machine Co., Newark, N. J.

VULCANIZERS
John Royle & Sons, Paterson, N. J.
Watson Machine Co., Paterson, N. J.

VULCANIZING PANS
American Insulating Mach'y Co., Phila., Pa.

WIRE—Enameled For Coils
Winsted Insulated Wire Co., Winsted, Conn.

WIRE—Nickel Silver and Phosphor Bronze
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Seymour Mfg. Co., Seymour, Conn.

WIRE—Various Kinds
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Seymour Mfg. Co., Seymour, Conn.
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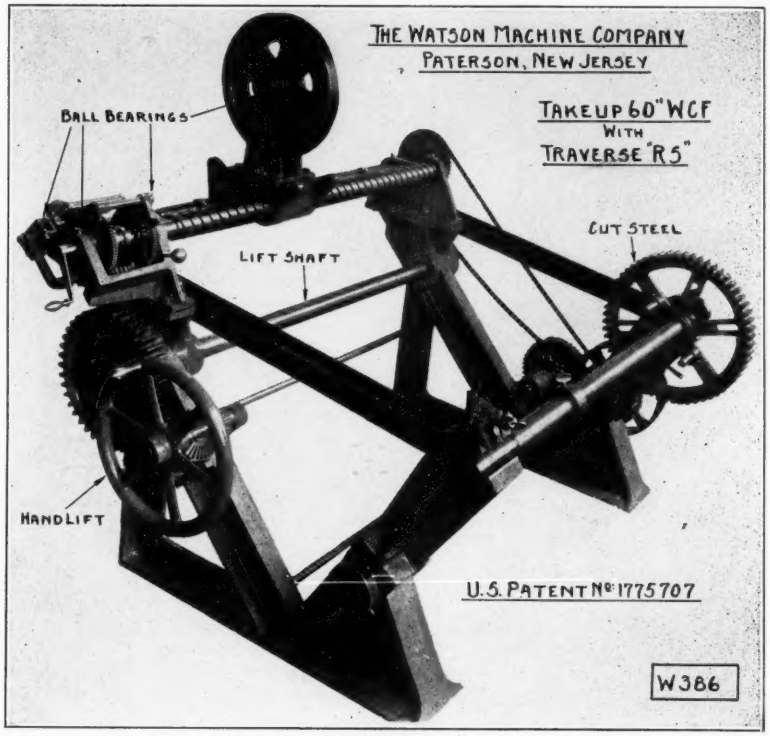

Built in 2 sizes—60″ for reel weights up to 6,000 pounds, and 72″ for reel weights up to 12,000 pounds.

This design results in a gear driven reel (the most satisfactory type of drive for heavy pulls) at any position above the floor.

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Lift by handwheel is standard, the mechanism being exceedingly powerful and free in action. Motor lift with controller as shown in photo W-430 supplied at extra cost.

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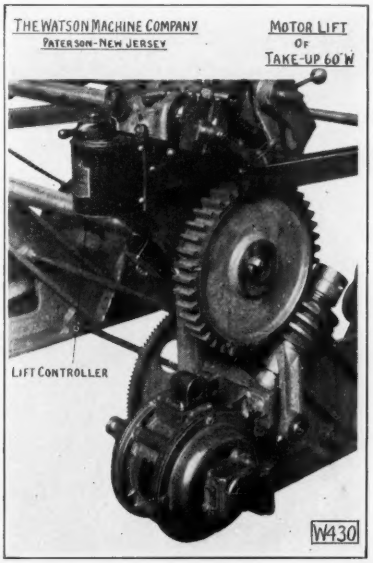
Send for descriptive literature on Takeups and Traverses.



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